

BBC A3000 · ARCHIMEDES · BBC · MASTER

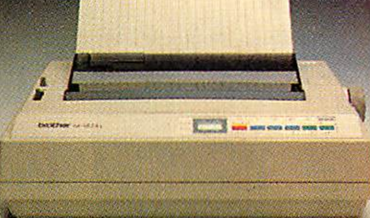
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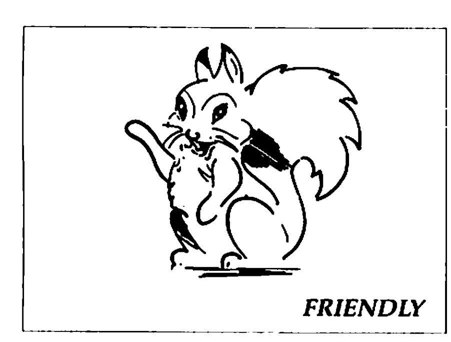


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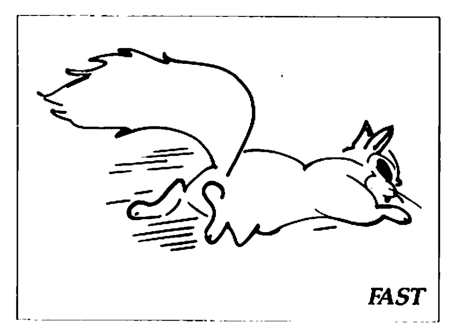


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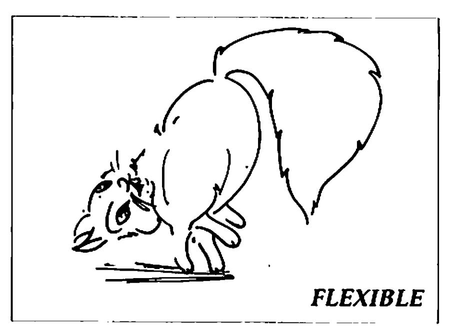
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Squirrel is the easiest to use database yet, allowing simple point and click database creation and queries.



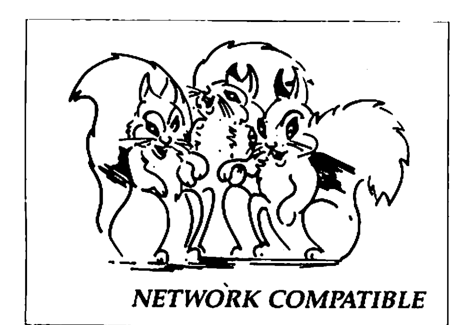
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Client/server design ensures that squirrel runs just as well on networks as standalone.



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People are getting the *ideA*!

"a beautiful solution ... unique, quick, quiet and incredibly convenient ... ICS should be praised for the instruction manual" – *BBC Acorn User, April (reviewing A3000 Internal)*

"installation procedure was quite trivial ... dual colour LED is a neat solution ... used extensively for weeks, everything perfectly straightforward (including running a DOS partition) ... good devices at competitive prices" – *Archive, January (reviewing A310 Internal)*

"very impressive ... fan is quieter ... no difficulty in running all fully RISC OS applications" – *The Micro User, January*

"What a good idea" – *Margaret Thatcher*

– Look out for reviews in RISC User and Archimedes World soon –

We have now added external options to our range of *ideA* hard disc upgrades. IDEARCEX serves the A300/400/500 series, while there are two choices for the A3000. IDEA3EX provides an external hard disc but uses the internal expansion slot, leaving the external slot free. It can work in conjunction with some disc buffer boards. Alternatively you can fit an IDEARCEX to the external slot, leaving the internal slot free (this option requires a podule case).

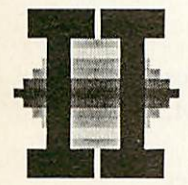
Of course the IDEA3IN20 fully internal 20 Mb hard disc remains the neatest answer for the A3000, offering security and robustness with hardly any extra weight and no extra size. The 60 Mb option has been delayed by the disc manufacturers till at least May, but we hope to have tested a 40 Mb by the time you read this.

We can't offer you an IDE tape streamer just yet, but you can have two complete 80 Mb hard discs installed for £748 (internal) or £878 (external). That's including everything except VAT.

All *ideA* discs are tested and guaranteed. Most are self-parking, and some have power-saving (they switch off automatically when not in use). The *ideA* system is compatible with RISC OS and ADFS.

Please see our full price list elsewhere in this magazine.

Acorn dealers and educational suppliers: don't miss out on our excellent trade terms! Please call.



TWO

TWO consists of a Task Organiser, a Window Organiser, and a few Useful Extras – all for £19.

The TASK ORGANISER allows you to group several jobs together under one name and perform them all with a single action.

This one action might load some fonts, install a printer driver, and start up a desktop publishing program with a particular file open and a directory displayed.

The task can be performed automatically when the computer is switched on, but it may also be selected from a simple list on screen.

Defining a task is just a matter of dragging icons to a dialogue box. You can give it a meaningful name, so inexperienced users will find it easy to start work using a list of tasks set up by a teacher.

The WINDOW ORGANISER provides three ways of tidying up the windows displayed on screen, making it much easier to find them.

A single click on the mouse will bring a window from the back to the front, even if it is not visible. You can also close all windows at once.

The USEFUL EXTRAS

• Timed screen blanking • Menu for *Copy and *Wipe options • Simplified *Backup • Easy control of *Configure settings, password-protected • Easy creation of Obey files • Quick cursor location •

Buy from us in April and we will pay the extra 2½% VAT!

(Cash-with-order sales only).

This will give you time to practise your 1.175 times table.

Cross-32 Meta-Assembler

This professional table-based cross-assembler works with over 50 target processors (including ARM2 and 3), and has been used for some time on PCs. A RISC OS desktop version by Baildon Electronics is now available. Cross-32 is user-friendly and supports conditional assembly and macros. Output is in absolute binary, or Intel or Motorola Hex formats (ideal for eprom programmers and emulators).

You can modify the tables supplied or add new ones to cater for new processors and opcodes.

Oddules

Baildon Electronics Oddules open the way to cheap, flexible and almost unlimited external expansion via the I²C bus already supported by RISC OS. Baildon are producing a range of Oddules which may be daisy-chained.

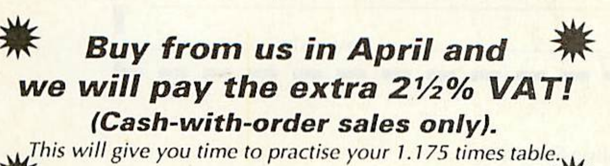
Ready now is the ***AnDi*** Oddule. It has eight digital I/O channels with high current open collector drivers, four A/D inputs, and one D/A output. AnDi is capable of emulating user and joystick ports, allowing ADVAL operation from BASIC, and the use of Concept Keyboards and analogue or digital joysticks.

DrawBender



DrawBender distorts Draw files to follow a shape of your choice. A useful addition or cheap alternative to Poster, supplied with these three decorative fonts.

DrawBender is simple to use, without any complex menu structures. The example above uses DrawBender with **FontFX** *– the two make ideal companions.*

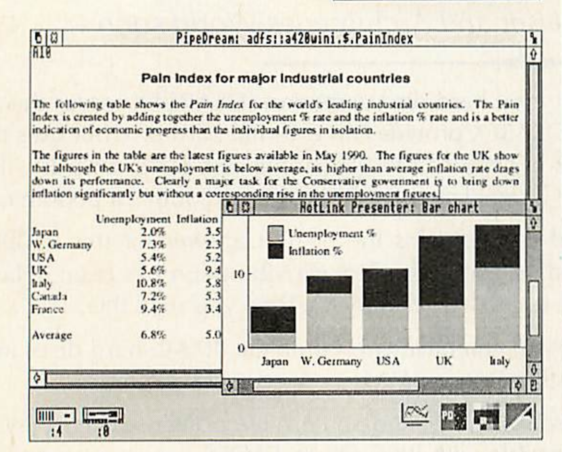


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PIPEDREAM 3

WINNER
of the 1989/90 BBC Acorn User Award for Best 32-bit Business Software



The bar chart in the screen shown above was produced by using the HotLink between PipeDream 3 and HotLink Presenter.

Major features include:

- intuitive RISC OS user interface
- many documents loaded at once
- display and printing of pictures within text
- wysiwyg display including all RISC OS fonts
- built-in 93,003 word spelling checker
- file compatibility with PC & Z88 PipeDream & BBC View Professional
- natural, background recalculation
- keystroke compatibility with Z88 & PC PipeDream
- Z88 filing system
- automatic loading of VIEW, ViewSheet, Lotus, First Word Plus, Tab and CSV files
- automatic saving of VIEW, Lotus, Tab, CSV and Acorn DTP format files
- multi-field sorting
- 62 spreadsheet and database functions
- external references between documents for 3-D modelling
- macro file recorder
- slot protection

colton software

PipeDream 3 breaks down the barriers between word processor, spreadsheet and database. With PipeDream 3, you can include numerical tables in your letters and reports, add paragraphs to your spreadsheets, and perform calculations within your databases.

PipeDream 3 has been written to take full advantage of RISC OS – if you can use RISC OS, you can use PipeDream 3. It is fully multi-tasking and multi-windowing, so you can work on many documents at once and instantly move information between them. PipeDream 3 can automatically load and save most popular file formats and is the first program to use the new RISC OS HotLink, which enables it to interact dynamically with Archimedes graphics programs, such as *HotLink Presenter* from Lingenuity and *GraphBox* from Minerva.

As well as winning the 1989/90 BBC Acorn User Award for Best 32-bit Business Software, PipeDream 3 was runner-up in the Best 32-bit Educational Software and Best 32-bit DTP/Word Processor categories.

PipeDream 3
Breaking down the barriers

POWER • SPEED • FLEXIBILITY • EASE OF USE

PipeDream 3 is for all Archimedes computers with 1Mbyte or more of RAM, including the A3000.

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PipeDream 3 costs £147.00 + VAT.

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MAY 1991 ISSUE 106

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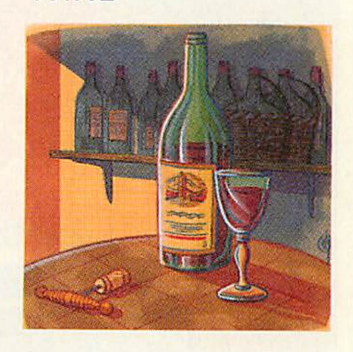
Published by Redwood Publishing, a BBC Enterprises Company, 20-26 Brunswick Place, London N1 6DJ. Tel: 071-490 1444. Telecom Gold 10081:RED001, Micronet 919992492. Bureau setting and Ad typesetting by Bold Gray Design, 52 Rosebery Avenue, London, EC1R 4RP. Colour by Trumps Studio, Ware, Herts. Printed by Riverside Press, St Ives PLC, Gillingham. Distributed by BBC Frontline, Park House, 117 Park Road, Peterborough.
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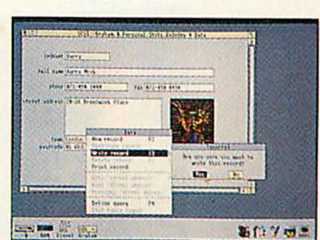
PRODUCED ON THE ARCHIMEDES

All the editorial pages in *BBC Acorn User* are produced on a DTP system using Acorn Archimedes 440/1 and A540 computers, Computer Concepts' *Impression 2* with Laser Direct printers, and Taxan monitors.

86 NEW WINE



126 TOP OF THE TREE



83 FONT FANTASY

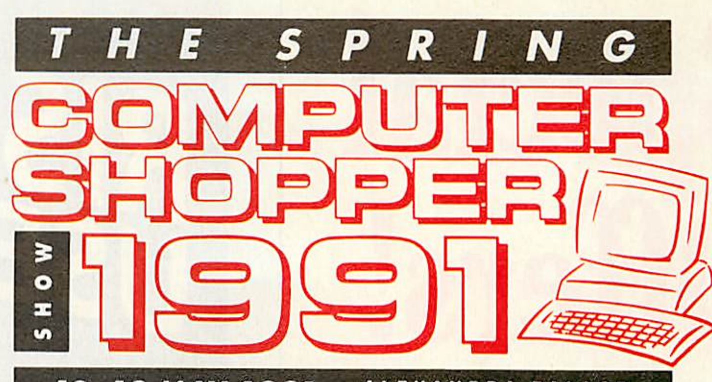


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If Aladdin had owned a computer – or wanted to buy one – he'd have been the first in the queue.

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RISC User offers 10 magazines a year which typically contain:

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Programs and articles on sound and graphics
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- 'Mastering the Wimp' — series on Wimp programming
- 'Under the Lid' — hardware series
- 'Assembler Workshop' — all about ARM Assembler
- 'Beginning 'C' — series on C language
- 'DTP/WP' — advice on using commercial software
- 'Arcade' — a round-up of the latest games

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Postbag for your letters and answers to your questions
Technical queries and expert answers

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WE'RE ON OUR WAY TO WEMBLEY!

THE GOOD news for Acorn fans is that the annual *BBC Acorn User* Show will be back in the Autumn at a prestigious new venue.

BBC ACORN USER SHOW '91

London's Wembley Conference Centre will stage this year's show, from Friday to Sunday, October 11 to 13 inclusive. At the time of going to press, final preparations were being made to ensure that this year's event will be a *must* for all Acorn enthusiasts.

Over 60 exhibitors are expected to attend the event, which is deliberately being staged a bit later than last year's September show to enable more people involved with education to attend.

The show will be supported by Acorn and will feature many attractions, including special activity areas and regular seminars to enable visitors to become fully interactive with the products on display.

And, with the 10th anniversary of the BBC micro approaching, there will be a chance to look at a history of Acorn machines and, more importantly, to hear about the future.

On that note, rumours abound that the Autumn will be a hectic time for new Acorn product launches, so the show could well be your first opportunity to see the new generation of Acorn machines. Watch this space.

The show will be attended by most of the key software and hardware peripherals suppliers, so expect to see the very latest new releases for the pre-Christmas period.

Of course, members of the *BBC Acorn User* team will be there throughout the show – indeed, we are considering running our Archimedes-based desktop publishing system at the show so that visitors can see how we produce the latest edition of the magazine.

The show will be a *must* for any Archimedes or Beeb user – so watch the magazine for further details of ticket applications and opening times.

HANDY ANDI ODDULE

A NEW concept in low-cost computer input/output, with applications ranging from data acquisition to video subtitling, has just been introduced.

The Oddule communicates with the host computer using the Philips I^2C bus, which is already implemented in many computers, including the Archimedes.

Oddules can be easily daisy-chained together to create a peripheral configuration to suit the user. Because oddules are tucked away behind the computer, they are easier to connect to external systems.

The first available Oddule, made by Basildon Electronics and distributed exclusively through Ian Copestake Software, is a combined analogue and digital input/output device called the AnDi Oddule which combines four channels of eight-bit analogue inputs, one eight-bit analogue output channel and eight-bits of digital input/output. Up to eight AnDi Oddules may be connected on the same bus.

Oddules under developments include a multimeter, a VDU, a teletext data acquisition system, a video subtitling system, a speech synthesiser and a bus expansion system. Interfaces for computers without a built-in I^2C bus will also be available.

Contact ICS, 10 Frost Drive, Wirral, Merseyside L61 4XL. Tel: 051-648 6287.

PIRACY CLAIM SETTLED

ALEPH One, which makes the Arm 3 upgrade processor enhancement for the Archimedes, claims to have received undisclosed compensation from Worthing-based CJE Micros for 'flagrant and outrageous breach of copyright' relating to Aleph software.

The software in question allows the user to control the speed of the Arm 3 chip from the Risc OS desktop. According to Laurence van Someren, managing director of Aleph One, CJE admitted that some 50 copies of the software were shipped to purchasers of that company's own Arm 3 upgrade, without Aleph's permission. Minor modifications were said to have been made to the software – including the replacement of the author's copyright message – but all program codes were unaltered.

'It is important for everyone who owns software to assert their rights whenever they are infringed,' said van Someren. 'We shall continue to do so.'

CONCEPT DESIGNER HAS BUGS!

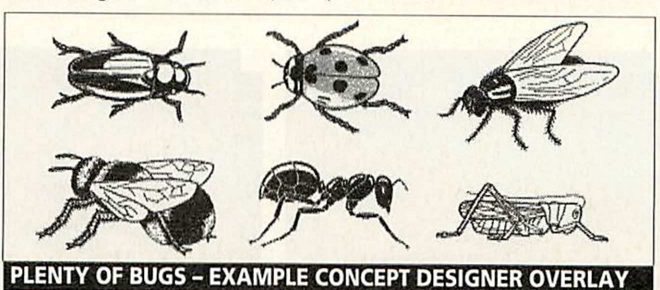
NEW SOFTWARE will allow a wide variety of Concept Keyboard overlays, containing subjects ranging from insects to members of an orchestra, to be designed and created to drive virtually all multi-tasking Risc OS programs.

Concept Designer, developed by Longman Logotron in conjunction with the Concept Keyboard Company and the National Council for Educational Technology, enables the user to create overlays on a Concept Keyboard to emulate keystrokes on a conventional keyboard.

The software includes two utility programs: *TouchData*, which is an enhanced version of *Touch Explorer Plus*, complete with multiple overlays, outline fonts and graphic display capability; and *SoftTouch*, which simulates a Risc OS Concept Keyboard on screen.

It is possible to transfer overlays and their associated files between applications. You can divide the overlay into a series representing yes, no, left arrow, right arrow, and so on.

The system will operate with any currently available Concept Keyboard. *Concept Designer* costs £27.60 and is available from: Longman Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ. Tel: (0223) 323656.



PLENTY OF BUGS – EXAMPLE CONCEPT DESIGNER OVERLAY

FIGHT THE FLAB

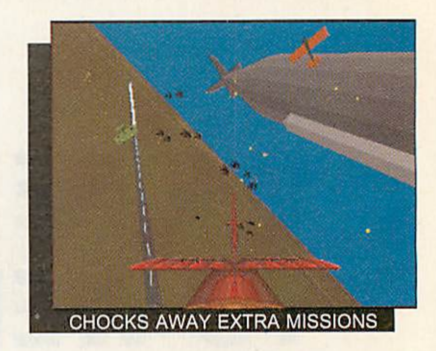
SPENDING hours at a time staring at a computer screen may not be good exercise, but new software has been designed to help Arc users watch their weight.

The Diet Manager allows you to drag 'food' from a larder onto a tray and then analyse it to find out how many calories, proteins, fats, etc, you are about to consume.

Diet Manager costs £27.90 and is available from: Mewsoft, 11 Cressy Road, Hampstead, London NW3.

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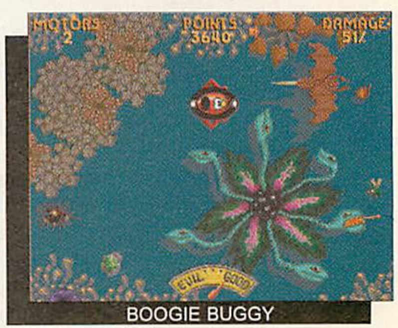
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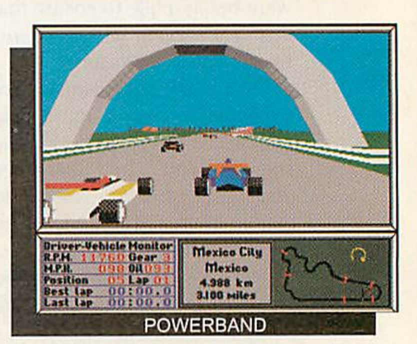
BBC A3000 & ARCHIMEDES

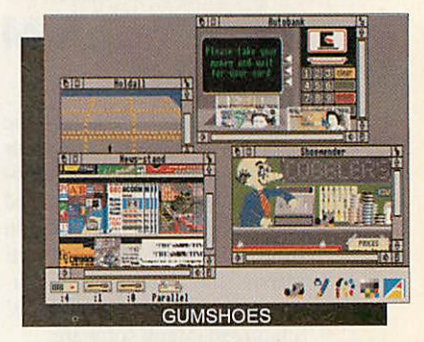
ALL the following Archimedes games are compatible with the BBC A3000 and 310 & 400 Series

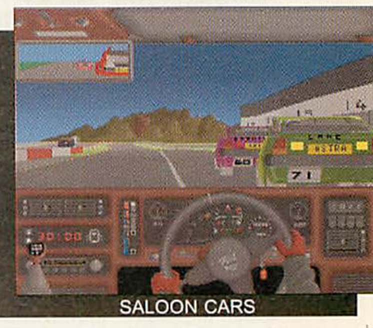
Chocks Away *(Biplane Sim. 1 or 2 players)*	24.95
Chocks Away Extra Missions	19.95
(26 extra missions plus some superb enhancements)	
Chocks Away Compendium	39.95
(Chocks Away + Chocks Away Extra Missions)	
Boogie Buggy *(SEE Coming Soon)*	24.95
Gumshoes *(SEE Coming Soon)*	24.95
ARCticulate *(SEE Coming Soon)*	24.95
The Wimp Game *(Unique Graphic Adventure)*	19.95
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The Real McCoy *(4 Game Compilation)*	29.95
(U.I.M., Arcade Soccer, White Magic & Quazer)	
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U.I.M. *(Massive 3D Action Adventure)*	29.95
Arcade Soccer *(World Cup 1-24 Players)*	19.95
White Magic *(Arcade Adventure)*	19.95
White Magic 2 + Designer	19.95
Quazer *(Furious Arcade Action)*	11.95

COMING SOON

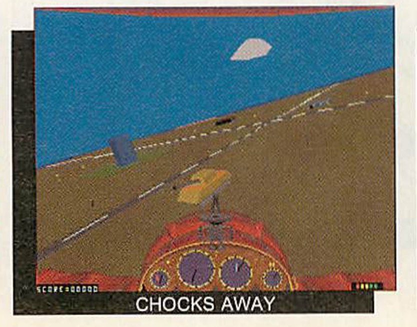
Boogie Buggy *(Original Arcade Game with Superb Graphics & Gameplay)*	**April '91**
Gumshoes *(Detective graphic adventure - multiple windows)*	**April '91**
ARCticulate *(A flexible, comprehensive and fun speech package)*	**April/May '91**
Saloon Cars *(Incredibly realistic saloon car racing challenge)*	**June '91**
Break 147 & Superpool *('Real' snooker & pool simulator par excellence)*	**June '91**

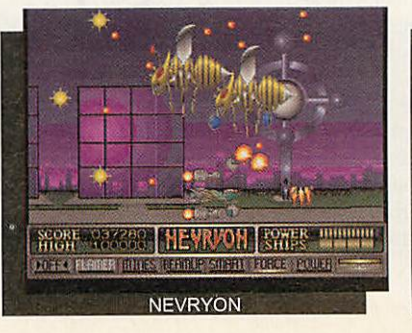

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COLOURFUL LINK TO THE MAC

IF YOU want to transfer colour graphics images between the Archimedes/BBC micro and the Apple Macintosh, then the new *Colour Screen>>Mac* software from Human-Computer Interface Ltd is the answer.

Designed to follow on from HCI's *View>>Mac*, the new software allows designers and artists to transfer paint packages between the Mac and the Archimedes and BBC B, Master and Compact machines. The new software aids the creation and manipulation of images using different packages on a wide variety of machines.

Also, *Colour Screen>>Mac* allows programmers and designers working on other computers to make use of clipart and scanned images designed for the Macintosh.

It will also help publishers and technical writers who need to include screen displays from other computers in documents created on the Mac.

Included is the ability to transfer files to and from an Archimedes or BBC micro via a serial cable. Alternatively, files can be exchanged between the Mac and an Arc via a 3.5in DOS-format disc, using Apple File Exchange.

Colour Screen>>Mac converts to and from an Archimedes sprite in any appropriate mode. If the file contains a number of sprites, the required one can be selected from a list of their names.

With the BBC, Master or Compact, it converts to and from a screen dump in any appropriate mode, including teletext. The colours assigned to each logical colour in the original dump can be adjusted to take account of different palette settings.

Colour Screen>>Mac costs £109.25. Contact Human-Computer Interfaces, 25 City Road, Cambridge CB1 1DP. Tel: (0223) 314934.

NEW PRINTER CAN SIT ON YOUR LAPTOP

TIRED of lugging that bulky desktop dot-matrix printer around? Well, Seikosha has come to your rescue with a new laptop printer that could save you a lot of backache.

The slimline LT20 is a 24-pin dot-matrix printer which is said to offer a true multi-copy printing facility. Weighing just 5.9lb, the printer is easily portable.

The LT20 offers printing speeds of 180cps in draft mode and 60 cps in LQ (letter quality) mode. Multi-part stationery, standard A4 sheets or letterheads can be easily handled through the printer's flat bed paper path, which helps eliminate paper jamming.

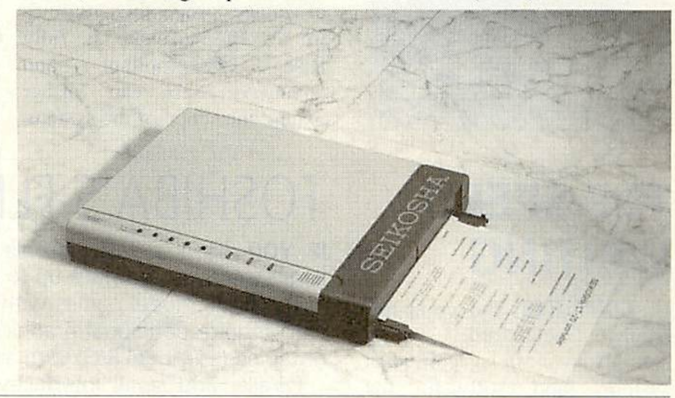
The printer also conserves space with a built-in cut sheet feeder, enabling up to 50 sheets to be stacked ready for printing.

There is a selection of nine different fonts, including Courier 10, Prestige Elite and Script, which can be displayed in a variety of styles, including bold, italics, expanded and condensed.

All printer settings are done via a push-button control panel on the front of the printer.

The LT20 has a standard parallel interface ensuring hardware compatibility. Three power options – mains AC, optional NiCad or 12V car battery – are available.

The LT20 costs £425. For further information, contact Seikosha (UK) Ltd, Unit 14, Poyle 14, Newlands Drive, Colnbrook, Slough, Berks SL3 0DX. Tel: (0753) 685873.



FASTEST CD-ROM FOR ARC?

HITACHI New Media has introduced what it claims to be the fastest CD-Rom drive currently on the market.

The Archimedes-compatible CDR-1700 has an average access time of 340ms, using Hitachi's new linear motor and a string of other advanced features.



Equipped with Hitachi's proprietary Automatic optical Lens Cleaner (ALC) mechanism, the unit ensures integrity and safety of data, incorporating three levels of safeguard.

The unit can daisychain up to eight units using Hitachi's optional IF18-A interface card, a three-way caddy ejection and a new error-correcting LSI (large scale integrated circuit) system.

The drive costs £595. Contact Hitachi Sales (UK) Ltd, Hitachi House, Station Road, Hayes, Middlesex UB3 4DR. Tel: 081-848 8787.

ANY BRIGHT IDEAS?

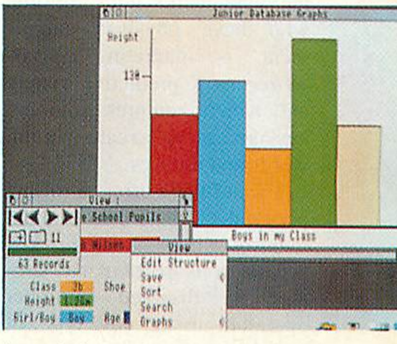
DO YOU have any bright ideas on how a database might be used as part of school activity project?

If so, now is your chance to let us know about it – and win some software.

BAU and Cambridge-based Iota Software are running a competition giving you the chance to win Iota software, including *Junior Database* (right) and *Touch Type*.

The best suggestions will also be published as part of an 'Ideas' booklet sent out to users of *Junior Database*.

You can take anything from one page to 10 pages to explain your ideas. But



length is not important – it is originality we are looking for.

Enter your name and your school's name and address on the project and send it to: Bright Ideas Competition, Iota Software Ltd, St John's Innovation Centre, Cowley

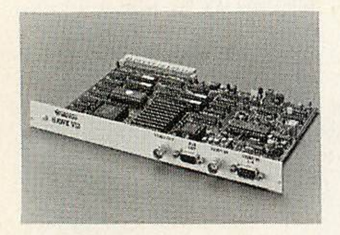


HAWK V12 GETS OFF THE GROUND

WILD VISION, one of the leading expansion card manufactirers in the Acorn market, had two good reasons to celebrate recently – the launch of the company's new Hawk V12 video framestore and the opening of its new premises in South Tyneside.

The Hawk V12 (see picture below) is the latest development by WV to achieve high performance image procesing and analysis with the Archimedes.

The product, combined with *Arcimage 4* software designed by Foster Findlay Associates, can store up to four images, each 512 × 512 pixels, with four binary overlay planes for each image.



Features inherent in the framestore allow high speed calculations and comparisons, providing valuable information about the image being studied.

This kind of analysis has attracted considerable interest from Archimedes users involved with industrial and medical applications, and many areas of research could benefit from the system.

Because image processing involves the manipulation of considerable amounts of data, the high speed Risc technology of the Archimedes offers significantly better value than, say, a PC-based system. Used with the Archimedes A540, WV claims that the framestore performs favourably compared with any workstation-based system, at a lower price.

Arcimage 4 is based on Foster Findlay's *C_Images* library of image processing routines in C. The software is fully Risc OS-compliant and advanced users can further extend the scope of the system.

Meanwhile, further development will continue at Wild Vision's new premises in Tyne and Wear. Acorn's systems design manager, Roger Wilson, recently opened the high-tech factory and office unit, and is pictured here with Wild



Vision's managing director, Peter Wild (left) and Acorn marketing manager Warwick Hirst (centre).

Wild hopes to further encourage parties with specific requirements for Acorn expansion cards to talk to the company about custom design and development services.

For further information, contact Wild Vision, 15 Witney Way, Boldon Business Park, Boldon Colliery, Tyne and Wear NE35 9PE. Tel: 091-519 1455.

TOP SPEED WRITING

LE COMPUTER, the company from Chelmsford which specialises in computer systems and software for special needs, has released *Speedwriter* for the Arc.

Vanessa Lees of Le Computer, who works with children who have physical impairment, is marketing *Speedwriter* as a predictive typing aid which requires minimal key access to create certain words and phrases.

The software offers a rolling personal dictionary that requires only single key access. It is particularly suitable for disabled computer operators using any type of switch arrangement.

Speedwriter costs £57.50 and is also available for the BBC B and Master.

Contact Le Computer, PO Box 29, Chelmsford, Essex CM3 1QS. Tel: (0245) 362225.

TOSHIBA'S FLEXIBLE LASER

IF YOU need a fast, flexible laser printer, Toshiba's new PageLaser 8 can produce up to eight pages per minute.

The basic model comes with 512Kb of Ram and, for those who require additional graphics capability, the printer can be obtained (as model 8/G) with an additional 1Mb of Ram.

Parallel and serial interfaces are fitted and resident fonts include Courier 10 and 12 in various styles. Resolution is up to 300dpi with the optional 1Mb. PageLaser 8 costs £1445. Contact Toshiba UK, Toshiba Court, Weybridge Business Park, Addlestone Road, Weybridge, Surrey KT15 2UL.



THE NEW PAGELASER 8 PRODUCES EIGHT PAGES PER MINUTE

NEWS IN BRIEF

● **TOPOLOGIKA**, the Peterborough-based software house which has been concentrating on its range of educational software recently, will soon be back on the adventure trail.

Spysnatcher is the long-promised adventure game which is set for release in the Autumn. Inspired by Peter Wright's book, Spy Catcher, the new game will be for BBC B, Master Compact, A3000 and Archimedes. For further details contact Topologika, PO Box 39, Stilton, Peterborough PE7 3RL. Tel: (0733) 244682.

● **WE HAVE** have a couple of minor amendments to last month's Arcterm 7 review. First, Arcterm can read Hearsay and Arcomm format frame stores without having these programs loaded. The package now has a scroll back buffer, so you can look back over your on-line session even if the data has gone from the main window. Finally, the price is £79.75 including post and packing.

● **DAVID McDONALD** from Crowland near Peterborough recently won an Acorn Learning Curve system on BBC 1's Going Live programme. David, aged 13, correctly answered that Risc stands for Reduced Instruction Set Computer. He was already familiar with the A3000, since it is used at his grammar school in Spalding.

● **VISITORS** to the Spring Computer Shopper Show will get the opportunity to see more than 20 new products for Acorn users launched at the event.

Pres is currently working on several new products which it hopes will be ready for the show and Fourth Dimension will be unveiling new Arc games, including Chocks Away: Extra Missions. The show takes place at Alexandra Palace from May 10 to 12.

● **CONTEX** Computing has released a low-cost spreadsheet for the Archimedes. Spreadsheet MkV has been popular with Beeb users and is now Risc OS compatible.

The initial release price is £15 and includes a manual for as long as stocks last (thereafter, it will be supplied as a text file on the disc).

Existing users may upgrade by returning their original disc and £6. Contact Context Computing, 15 Woodlands Close, Cople, Bedford MK44 3UE.

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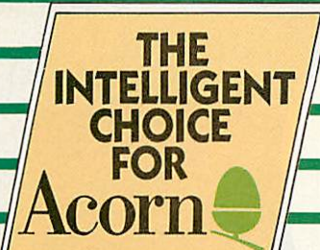
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AU5

Chess3D

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TRIAL OFFER

Cut-down version of program (player v player only) available at £2.95 to enable you to experience the graphics. This is completely refundable against purchase of the full game.

AUTHORS

If you have written or are writing Archimedes software of commercial standard and are seeking a Publisher please write to Bob Simpson at the address given, preferably with a working sample of your program.

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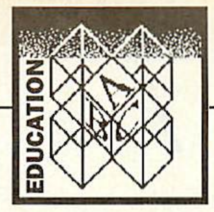




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EDUCATION SHOW SUCCESS

ACORN was among the companies with a stand at the Education Show, a new exhibition held in early March at London's Olympia exhibition centre.

Unlike BETT, the Education Show doesn't concentrate primarily on one curriculum area. Instead, it encompasses the whole range of companies supplying products into the education market, from blackboards to musical instruments to lab equipment.

The rationale is easy to see – under LMS, in order to make informed decisions about the disposal of limited finance, teachers will need first-hand experience of as many of the products available as possible.

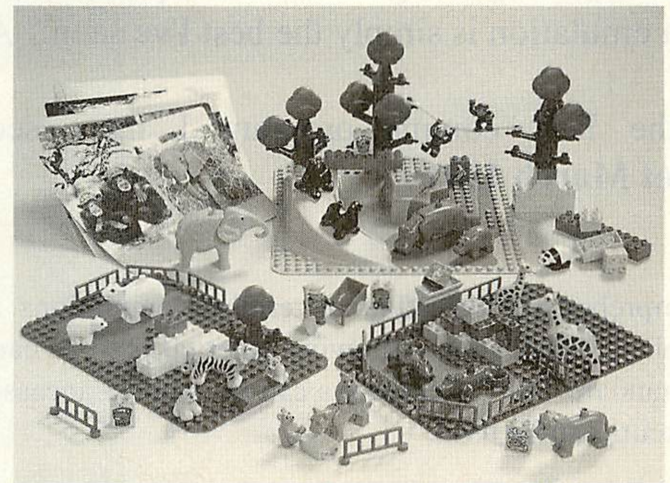
When I was there, the Acorn stand was pretty quiet and it was the book publishers which were doing big business, but well over 5000 people visited the show, so it's likely that there will be another show next year.

Among the suppliers supporting Acorn was ESM. Its latest launch was on show but, unusually, it isn't a piece of software, it's a pack of 44 photocopiable maths activities entitled *Mathematics from China*. Written by the well respected author Anita Straker, the materials were developed to encourage children to learn more about Chinese people, their culture and the mathematical ideas which form the basis of current mathematical concepts.

The prize for the cutest new launch (see picture above) undoubtedly went to Lego Dacta, the education division of Lego UK.

It introduced the Duplo Wild Animal Park pack, an animal-based technology set consisting of 92 moulded plastic creatures and a base board. Through play, the models can help create an environment for children to talk about such things as animals at risk, where they come from, where they live, caring for animals and conservation.

ESM is at Abbeygate House, East Road, Cambridge CB1 1DB. *Mathematics from China* costs £17.50. Lego Dacta can be contacted at Ruthin Road, Wrexham, Clwyd LL13 7TQ.



THE DUPLO WILD ANIMAL PARK PACK – CUTE OR WHAT?

STEP BY STEP

Coming up with new ideas for teaching science and technology is often quite difficult. However, help is at hand with a set of resources from the online database NERIS called *Steps* (an acronym for Science and Technology Education in Primary Schools).

The discs provide, at the touch of a button, a wide range of materials and suggestions, all, of course, relevant to the National Curriculum. There are 49 entries, each offering ideas for experiments, projects, visits and extra reading.

The strength of *Steps* is that it has been compiled by practising teachers and contains material that has been used successfully in the classroom.

Versions are available for the BBC and Archimedes and cost between £11.50 and £13.80, depending on format. NERIS can be contacted c/o Maryland College, Leighton Street, Woburn MK17 9JD.

ALTERNATIVE VIEWS

Previewed at BETT and now available, *Viewpoints* is yet another excellent package from Sherston Software.

It provides visual environments which junior and lower secondary children can explore, in the same way as they would explore the countryside, the seaside, a village and an underwater setting.

This program can act as an excellent starting point for both oral and written work.

It has a strong interactive element and has been designed to be used in various ways, for instance for planning, for finding out about different environments, for developing mapping skills and for practising information storage and retrieval.

Also new from Sherston comes *Draw_Help* which builds on the success of *Help*, the company's companion to the Archimedes and A3000.

The substance of the pack is a 96-page book with a series of straightforward, constructive tutorials and a disc which introduces users to *Draw* and some of its many applications.

In addition, the pack contains two new outline fonts: Olivia, a decorative font, and Junior, which is clear, simple and suitable for school use.

There is also a disc full of clipart, including maps of the UK, weather symbols, electronic symbols and a selection of popular cartoon characters.

Both these packages are for the Archimedes. *Viewpoints* costs £35 and *Draw_Help* is £15.95. The address of Sherston Software is Swan Barton, Sherston, Malmesbury, Wiltshire SN16 0LH.

Lisa Hughes

NEWS IN BRIEF

● **SUNNYHURST** Software has a new pack for the BBC Master, called Our National Parks.

It's aimed at geography students and consists of a database containing information about National Parks in England and Wales and related topics. The information is accessed and displayed in teletext page format.

The pack costs £8.50, of which £1 will be donated to the Council for National Parks. You can contact Sunnyhurst Software at 3 Sunnyhurst Cottages, Darwen, Lancashire BB3 1JX.

● **MIX** and Match with Maggie is a new Archimedes program from Scetlander. Featuring a reputably 'adorable' monster called Maggie, it promotes pre-reading skills and is intended for educational use both at home and in school.

Maggie helps young children (and older students with learning difficulties) recognise, discriminate and remember pictures, shapes, letters and numbers.

The software can be customised to suit all abilities and results may be recorded, retrieved and printed, making assessment relatively easy.

The PC version contains digitised speech but unfortunately sound is limited with the Arc software. Mix and Match with Maggie costs £24.99. Scetlander is at 74 Victoria Crescent Road, Glasgow G12 9JN.

● **FOLLOWING** its resounding success in Glasgow, the Art Machine show finally comes to London, from 25 April until 16 June.

The variety of exhibits, including specially commissioned work and hands-on computer designing with the Archimedes, make it enormously fascinating and well worth a visit.

You can find the Art Machine in the Barbican's Concourse Gallery. It's open seven days a week and entrance charges are very reasonable: only 50p for children and £1 for adults.

School parties are welcome but must be booked in advance. For further information telephone the Barbican on 071-638 8891.

Teachers will be interested to know that some of the programs which were developed for the show are also available from, Topologika, PO Box 39, Stilton,

ARCterm 7

£79.95 inc VAT

"ARCterm is a great comms package even compared with the best from other computers...the viewdata emulation is simply the best I've seen." **Acorn User April 1991**

"ARCterm is easily the best comms program I have seen and is unreservedly recommended." **Micronet March 1991**

ARCterm 7 provides a comprehensive selection of terminal emulations and file transfers in a single multitasking RISC OS compliant application - allowing other tasks to be carried out while, for example, a download is taking place. Standard RISC OS menus can be used to access the functions or alternatively the extensive keyboard shortcuts can be used.

Features provided include:

Emulations: TTY, VT52, VT102 (including printer support and 132 column mode), PC ANSI, TTNS/ Campus 2000 (developed in conjunction with Hampshire LEA), BBC scrolling and Viewdata. Text emulations have a 256-line history buffer for reference or printing/saving.

File transfers: Xmodem/CRC/1k, Ymodem/-g, Zmodem, Jmodem, Kermit (including long packet, compression, and server support), SEAlink, ASCII and CET.

Host mode: Allows remote access to your computer, including public and private message facilities, file transfer, and '*' command access.

Dial store: 100 names, numbers, configurations and log-on sequences can be stored (password protected if required). Facilities to search/sort the directory and also to import ARCterm 6.01 or Hearsay format directories are included.

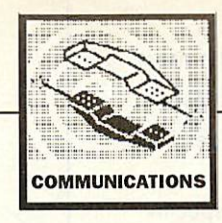
Error correction: MNP level 2 and Vasscom error correction protocols are supported in software, along with modem driver support for error-correcting modems.

Script language: A structured script language is provided to allow automation of complex communication tasks. It includes such features as for-next, repeat-until, while, switch-case and if-then-else structures, local variables, functions and file handling. Example scripts are provided to automate tasks such as mail collection/delivery and a supplied converter will import ARCcomm scripts.

Modems: Supports most modems, including: HST, SM2400, WS3000/4000, TM512, Linnet, Quattro, Hayes, Demon.

For more information ring and ask for the full specification or call our BBS system

The Serial Port, Burcott Manor, Wells, Somerset, BA5 1NH
Voice: 0243 531194, Fax: 0243 531196, BBS: 0749 679794/670030



AVOID CATCHING VIRUSES

VIRUSES always seem to get a lot of coverage in the media, leading to concern about their effects among users. But, how do they affect users of Acorn machines?

A virus is generally 'spread' via crucial system files, such as OS and DOS discs, or inside applications. Datafiles are usually safe because, if a virus did hide within one, it would never be executed.

So Acorn users are fairly safe from viruses. It is very difficult, if not impossible, for a virus to affect BBC machines, mainly because you usually reset the machine between running one program and the next, thus halting anything happening inside.

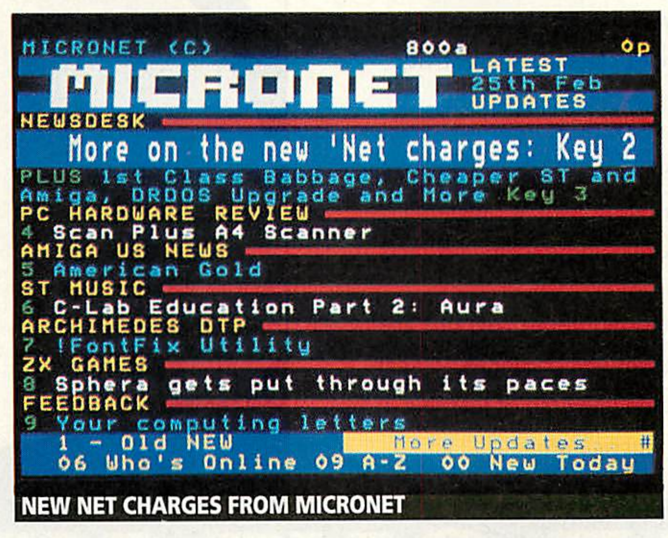
Both the Archimedes series and BBC micros have their operating systems in Rom, which is impossible to alter from software, so a reset between programs will ensure nothing harmful is lurking in the background.

However, the multi-tasking capabilities of the Archimedes makes it inconvenient to reset after each application. Indeed, that is one of the disadvantages of Risc OS.

This is how one Arc virus, called Extend, gets into the machine. The Extend virus is fairly rare, and is mostly harmless, so there is no real need to worry. I say mostly harmless, since all it does is randomly claim RMA memory every so often, which eventually results in a memory full error, requiring the machine to be reset.

Again, unlike other computer systems, it is difficult to run anything within Risc OS without knowing about it. Even though Extend does not have a 'task name', it does leave a blank line in the task display and appears as Extend 1.56 (08 Jul 1989) if you type *HELP MODULES.

The virus actually spreads by attaching itself to the Boot files of your applications – which is the only way a virus could work on the Arc. However, it is fairly easy to destroy. If you have downloaded files from bulletin boards, it is worth checking any Boot files inside them.



NEW NET CHARGES FROM MICRONET

A number of bulletin board system operators (Sysops) have issued warnings recently about checking all files, either uploaded or downloaded, from their boards.

Following a few simple rules after downloading a file will help to ensure that you reduce the chances of a virus intrusion.

Always place downloaded files on a blank, formatted disc. This will make sure that if you do inadvertently download an affected file, damage will be fairly localised. Most bulletin board files are archived by using David Pilling's *Spark* utility.

This has the added bonus that you can examine the contents of any archives without actually loading them. If a Boot file is present, then run a virus checker program through the disc.

If you do find a Boot file, try loading the relevant Boot into a text editor, such as *Edit*. If you find a line that reads RMEnsure Extend 0 RMRun <Obey$ Dir>.ModName, then delete the Boot file and also the file called ModName.

There are two programs available to do this: *VKiller* by R Lloyd and one by myself, called *Guardian*. They are available on this month's *BBC Acorn User* subscription disc (yet another good reason to subscribe to the mag! – Ed).

I don't want to cause too much concern, but forewarned is forearmed, so I should point out that it is extremely rare to find an Archimedes virus.

I have only seen Extend once and it is quite easy to spot, either by examining Boot files, the task manager or the module list.

NET CHARGES

FROM last month, Micronet, the viewdata network, underwent some changes to its charging.

Gone are the off-peak 1p per minute time charges, making it much cheaper to log in during the evenings.

Prestel charges have also been dropped during off-peak hours, so some services, such as mailbox, are now free.

This should encourage greater usage of the system and benefit more people.

The changes were made due to popular demand. When surveyed, most subscribers said they would prefer to pay a slightly higher annual subscription charge and lower time charges.

The quarterly subscription, rose from £20 to £30 (plus VAT) and peak time charges rose from 7p to 8p a minute to cover increased costs involved in running the system.

Prestel charges are 8p per minute peak. Free access is available only to Micronet subscribers.

Paul Vigay

NEWS IN BRIEF

● **THOSE** users of The World of Cryton bulletin board will have noticed by now that it has undergone a bit of a face lift.

Hugo has modified his ArcBBS software to provide a simple window environment. Each menu now has a bar at the bottom, providing handy commands or information.

A title bar at the top of the screen completes a window in the centre, where the main options are shown. This gives a much clearer layout overall and makes the system easier to use.

Give it a ring on (0749) 679794.

● **IF YOU** thought MNP5 was pretty good to look for in a modem, keep an eye out for Miracom's new MNP10 protocol.

The new unit is specially designed for tricky or awkward communications, such as over car phones, or international calls, or just poor quality connections.

Rockwell is set to incorporate it in its new chip sets for a one-off licence fee. Other manufacturers will follow in June.

● **A NEW** pocket modem, the Worldport 9600 has been developed by Andest Communications, based in Milton Keynes.

Claimed to be the world's first v32 pocket modem, the 9600 features Hayes compatibility and MNP up to level 4.

It measures only 4.8 xx 2.75 xxxxx 1in and weighs only 7.5oz. A single 9V battery will power it for up to two hours continously.

I wonder if it's fireproof, since the price of £920 is likely to burn quite a hole in your pocket.

Contact Andest Communications on (0908) 263300. The company also hopes to add MNP5 and v42 compression later this year.

● **I'M ALWAYS** happy to give various bulletin boards a plug from time to time.

James Willmott, who runs the Odyssey BB, started up in 1987 on a BBC Master with some home-written software and a v21/v/22 modem using the popular Viewdata format.

Today the board services BBC, Archimedes and IBM PCs and is on-line 24 hours a day. Contact Odyssey BB free on (0482) 870919.

● **IF YOU** have any information or questions on comms, write to: Paul Vigay, BBC Acorn User, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ.

If you haven't seen Longman Logotron's 1991 catalogue, chances are you aren't making the most of your school's software budget. Consider these brand new programs for the Acorn Archimedes:

- **Pendown**, a word processor designed specifically for education, with a range of new features offering control as well as freedom
- **Revelation**, a powerful image processing program which enhances classroom creativity across the curriculum.
- **Magpie**, a multi-media publishing program which enables children to draw on a wide range of sources to create flexible and exciting projects.

Individually or in combination, these programs are accessible to 6 year olds, yet will challenge 16 year olds and open an expanding universe of learning in support of the National Curriculum.



SHARE OUR VISION

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FREE MUSIC PROGRAMS

NOW that I've got your full attention... they are not completely free, but they only cost £3-£7 per disc. They may be available from several public domain and *Shareware* sources, but Norwich Computer Services was the only distributor to respond positively to my request for music programs by sending some.

Norwich has two types of disc – *Shareware* and *Careware*. Money from the *Careware* discs (less £1 for the disc and copying) goes to charity.

Now that a commercial version of *Tracker* has been released, it is a good idea to look at some *Tracker* tunes so that you can sample what you're getting for your money.

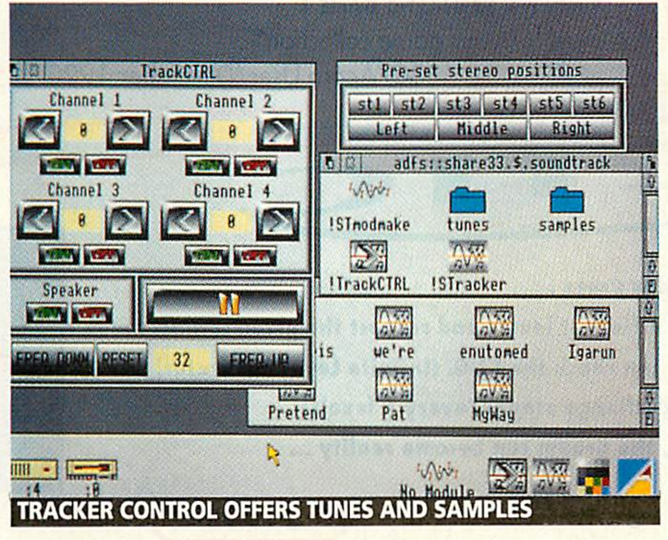
Shareware 23 contains three *Tracker* tunes and two for *Maestro*. *Shareware 24* contains version 1.03 of *Tracker*, along with a couple of demos. One piece is based around arpeggios and the other loops around a piece of house music.

Shareware 30 contains a Soundtracker Module (which installs, but does not appear on the icon bar, no stop or quit) plus five tunes – *Axel F* (excellent), *TestMod*, *Vivbeat*, *Dream* and *ProgFunk*. Another program shows various bits and pieces of information, while Soundtracker is playing and the disc contains copious notes. This is *the* disc for *Tracker* hackers.

Shareware 33 contains seven *Tracker* tunes and a program which lets you control the output of the channels, internal speaker and stereo positioning. Another utility splits modules into their component samples and song files.

The disc also contains 20 *Maestro* files (tunes both ancient and modern) plus a computerised metronome and a PD MIDI monitoring program called *MidiVision*, which is rather basic.

All the demos don't work with all versions of *Tracker*, but they work with the versions supplied on their respective discs. The discs contain lots of other programs too, so it is well worth requesting a catalogue from Norwich Computer Services.



TRACKER CONTROL OFFERS TUNES AND SAMPLES

The company can be contacted at 18 Mile End Road, Norwich, NR4 7QY. Tel: (0603) 507057.

MIDI GENERAL

Plans are afoot to launch a new MIDI standard. Called General MIDI, it is aimed at the non-technical user.

Each GM instrument will have identical sounds in the same preset positions, making it possible to play a piece of music on any GM system and have it sound exactly the same.

While this may initially sound like a good idea, the ramifications of GM extend far beyond its appeal to, and influence on, the consumer market. It has already caused some ripples of consternation in MIDI circles.

Consider the state of the musical instrument market if all GM instruments were to sound the same. What about the ability to create your own sounds, for example? And if GM does take off, will manufacturers still think it worthwhile to develop non-GM synthesisers?

As the music industry moves through a recession, GM will be hotly debated over the coming months. Is it a way to expand the market or could it be the end of MIDI as we now know it?

Keep watching this space for all Acorn music news.

Ian Waugh

ACORN AT MUSIC SHOW?

The premier exhibition for all things musical used to be the British Music Fair. But this year it has undergone a name change to the International Music Show.

But the key question is – will Acorn products be there? The organisers are now promoting it as a major European event (1992 and all that!) and hope to attract more overseas visitors and exhibitors to this year's event.

It takes place from July 10 to 14 at the Olympia exhibition hall in London – the first two days are trade only, Friday is Education Day and there will be many events of special interest to teachers, educationalists, parents and students. The public days are the weekend.

Music software was rather thin on the ground last year and I certainly didn't catch sight of an Acorn machine at the show.

This is *the* music exhibition in the UK calendar and looks set to become even more important internationally. If any software suppliers are attending, let me know and I'll let readers know through this column.

NEWS IN BRIEF

● **HYBRID TECHNOLOGY** has been at the R&D juice again as it continues developmentf the SoundWorld series. New additions include Soundstory, Soundscene and Soundsense.

Soundstory allows the user to link up to 15 pages of text (with optional reader branching) to musical performances to create musical stories, adventure games, drama soundtracks, and so on.

Soundscene is similar to Soundspace but, instead of using the screen to build new sounds, it co-ordinates graphic images with the sounds in response to touch. It was designed particularly for children of low ability.

Soundsense uses the new Music 6000, which detects movement up to 30 feet away using ultrasonics and converts it to sound. The beam can be channelled across a stage or focused in a column from floor to ceiling. Its response range can be reduced to just a few inches so children with disabilities can make music with minimal movement. For further details contact Hybrid Technology Ltd, 273 The Science Park, Cambridge CB4 4WE. Tel: (0223) 420360.

● **ANOTHER** disc of Ample music comes from the prolific pen of composer John Bartlett.

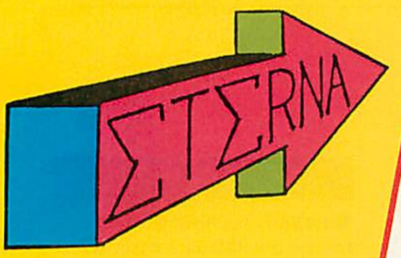
Guitars contains 10 pieces ranging in style from classical to rock/blues. There is music by Haydn, Albeniz and Fernando Sor – the 'Beethoven of the guitar' – along with some of John's very own compositions.

John's programming expertise shines throughout. There are bent notes, slides, tremolo, feedback and tonal changes.

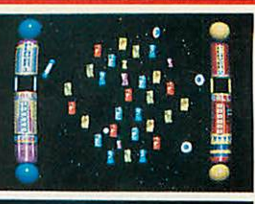
So you can hear for yourself the mastery which has gone into the creation of these pieces, John has kindly given us permission to include Spanish Mood in the yellow pages and on the monthly disc. To facilitate typing, the graphics have been removed from the listing. Type it, play it and believe it!

Guitars costs £3.95 from: JB Software, 20 Crawley Avenue, Wellingborough, Northants NN8 3YH. Tel: (0933) 675392.

● **IF YOU** have any music news, tips or topics you'd like to see covered in this column write to: Ian Waugh, BBC Acorn User, 20-26 Brunswick Place, London, N1 6DJ.



BALLARENA





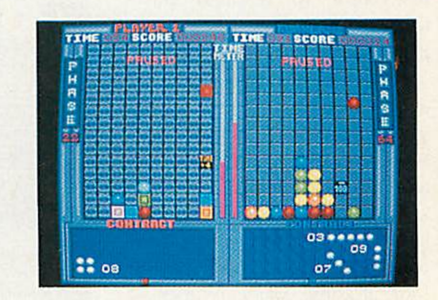
- A game of skill and reflex .
- Break it to get it .
- Beware of everything, even of your partner !
- A subtil mixture of break out and shooting game .
- Briks, monsters, bonus, traps, friends, ennemies .

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BBC/Acorn User/December 1990

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- A new challenge for all archimedes users .
You must travel through all the different levels and respect the given contact .
With all the friendly bonus, you can reach the I.L.G. (Infinite Level Generator)
- Passwords are given just after challenge stages (every 6 levels) .
- And if you find secret password, the dream can become reality ...
- Direct Arcade Conversion .

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- Earth need you . You are the ultimate warrior .
The only one, who can reach the invader planet and destroy what we can call : "THE BRAIN" .
You don't have time for compassion, just for destruction . Choose your weapon and remember :

' WE CAN NOTHING FOR YOU '
' BE THE BEST OR .... '

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- Take control over a fast rally buggy and race against various opponents, in a land of adventures (85 acres) .
Your car is upgradeable and will respond differently on tarmacs, sand or roks .
Of course, you're not MAD MAX
but if you meet him make him bite the dust .



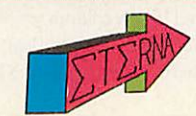
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£ 19.95

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Today you want a hard disc. 45Mb should be enough, after all you're managing quite well with floppies, and anyway you could never afford anything fancy like a CD ROM or a Magneto-Optical drive, and tape backup is really only a luxury when it doesn't take that long to backup 45Mb to floppy disc.

You may have thought the same when you bought a cassette deck for your Model B. How things change!

However, there is one big difference between then and now. Now, it doesn't cost a fortune to 'future-proof' your expansion options.

With Oak Solutions' 16 bit SCSI systems, you can add a hard disc to your computer from only £299, and yet when prices fall, you can add a Magneto-Optical drive, you can add CD ROM drives, you can add Cassette, Cartridge and DAT Streamers, you can add Flatbed Scanners, you can add Hard Discs of up to 2 Gigabytes capacity.

What about speed? The fastest hard disc we have yet found can transfer data through our SCSI card into Archimedes memory at 1.9Mbytes per second ***sustained***– that's faster than RAM on many systems. Today, these speeds are only needed for things like fast realtime data capture and multi-channel digital audio – but what about tomorrow?

Remember, all our SCSI products are manufactured and tested to the exacting standards imposed by our 'zero defect' quality control regime. We don't cut costs by missing out important components like fans, and we don't ignore the future!

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Archimedes SCSI Hard Disc with Controller Card
Low cost, high speed SCSI drives for 300 and 400 series machines.
Order code HDINARC✻✻WW (✻✻ = size)

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45Mb	399.00
80Mb	599.00
100Mb	795.00
200Mb	1195.00

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The cost effective way to add a top quality hard disc & controller to your A3000.
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20Mb	349.00
45Mb	449.00
80Mb	649.00
100Mb	845.00
200Mb	1245.00

High Speed Range Drives

Internal SCSI Hard Disc with Controller Card for all Archimedes 310/400 series computers. Complete with controller card. Comes with 24 month Warranty.
Order code HDINARC✻✻HS (✻✻ = size)

40Mb	495.00
80Mb	675.00
100Mb	995.00
200Mb	1545.00

External SCSI Hard Disc with Controller Card for all Archimedes 310/400 series computers. Complete with controller card. Comes with 24 month Warranty.
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40Mb	685.00
80Mb	865.00
100Mb	1185.00
200Mb	1735.00

Additional External SCSI Hard Disc Drive
Up to 3 additional drives can be added to the Oak SCSI controller making 4 hard discs in total. For the Archimedes A3000, 310 and 400 series. Comes with 24 month Warranty.
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40Mb	585.00
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Education price list available on request
All prices exclude VAT and delivery
VISA
Access
Delivery charges:

External Hard Discs/Tape Streamers	15.00
Internal Hard Discs	10.00
SCSI Card	3.50
Software	1.00

SCSI Tape Streamers

SCSI Tape Streamers with desktop software
All units require a SCSI card - add £100 if you do not already have one.

Worra Tape Streamer
utilising Compact Casette style 1/8"' tapes.
Order code CS✻✻SC (with SCSI card) CS✻✻SCA (no card)

20Mb	595.00
60Mb	795.00
150Mb	995.00

High Speed Range Tape Streamer
utilising DC600 type 1/4¼" cartridge units.
Order code TS✻✻SC (with SCSI card) TS✻✻SCA (no card)

60Mb	999.95
150Mb	1254.00

ST506 Hard Disc Drives

410 Internal Hard Disc Drive
For use with 'on- board' ST506 winchester controller. Complete with cables and mounting hardware and easy to follow fitting instructions.
Order code HDINARC✻✻ST (✻✻ = size)

20Mb	199.00
40Mb	315.00
47Mb	399.00

A3000 Expansion

A3000 RAM Upgrades
Easy to fit RAM upgrades to increase A3000 memory capacity to 2Mb or a full 4 Mb.
Order code A3RAM✻ (✻ = size) A3RAM2U for upgradeable

2Mb	65.00
2Mb upgradeable	85.00
4Mb	235.00
Upgrade 2Mb to 4Mb	225.00

A3000 User Port / Analogue Port
For A3000 internal expansion port.

User Port	65.00

Monitor Stand Steel construction

A3E10	21.00

System Housing Steel construction

A3E15	35.00

External Monitor Bridge Mounted SCSI Hard Disc
Comes complete with controller card & connecting cables. Drive unit housed in monitor bridge, colour matched to the A3000 with switch mode power supply and DC brushless fan.
Order code HDA3BEX✻✻SC (✻✻ = size)

20Mb	495.00
45Mb	595.00
80Mb	795.00
100Mb	1035.00
200Mb	1408.00

Archimedes Software

Genesis I
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CAPTION IT

As a video camera enthusiast, I was very excited when I managed to obtain a genlock for my BBC B (made by Video Electronics Ltd, which is no longer trading). However, I was unable to get any software for creating titles and graphics.

I had considered trying to develop my own software but 'the wife' has threatened divorce if I spend any more time at the keyboard!

It is for this reason that I turn to you for any recommendations of suitable titling and graphics software.

Steve Vialardi
Ashford

There are many eight-bit graphics packages around that would suffice, just take a look through the advertising pages of *BBC Acorn User.* As for titling software, try looking through old Eight Bits, where you are likely to find some routines that would spice up titles and captions.

QUESTION FILE

A few months ago I purchased an A3000 Learning Curve package. I am very pleased with the computer in general and I am finding the *First Word Plus* program particularly useful. However, one of the purposes for which I bought the computer was the storage and sorting of such things as exam questions (I am a history teacher). I had understood that as *Genesis* is a database I would be able to use it for this purpose. In practice I find *Genesis* complicated and frustrating to use, and not at all suitable for this purpose.

As a newcomer to computing I do not know which program would be most suitable for my needs and I would be grateful for your advice. I am looking for a simple to operate 'user friendly' program which I can use to store and retrieve textual data.

If, for example, I store several pages of questions on assorted subjects and wish to retrieve all those on Henry VIII, I should like to be able to enter HENRYVIII and be given half a dozen relevant questions. I would also like a program that is fully compatible with Risc OS, but I do not know how to identify a program from a mere list of names in an advertisement.

Mrs J A Rowley-Williams
Clwyd

There are several programs which could fulfil your needs. *Flexifile* is produced by Minerva and is a simple but effective card filing system (see the review in *BBC Acorn User,* January 1991). *Squirrel,* from Digital Services, is a new database which would also be suitable (see page 126 of this issue).

STRACKER SEARCH

I was wondering if you knew of any STracker file mixers for the Archimedes. Also, do you know of any good compilers/decompilers? If there are any such programs, then please could you tell me where I could lay my hands on them and at what cost?

Steven Dunlop
Stockton

The Serial Port produces a program called *Tracker,* which is specifically designed to let you edit and create new STracker files. It comes with two discs full of ready-made samples and STracker modules for you to play with and costs £50. Contact the Serial Port on (0243) 531194 for more details.

If you need a Basic compiler then either *ABC (Archimedes Basic Compiler)* from Dabs Press, or Silicon Vision's *RiscBASIC* compiler would suit your needs.

BASIC PROBLEM

Like one of your recent readers, I too am a retired, middle-aged owner of a newly acquired 2Mb A3000. I am having a great deal of fun learning how to use it.

However, in spite of reading the book, *A3000 First Steps,* and following your excellent monthly A3000 series, I still find computer jargon difficult to understand.

It is my firm conviction that writers of such publications still assume that all of their readers know considerably more than they really do. Some of us 'missed the boat' when it came to computer training and literacy. Don't forget that when we started work, a hand-operated rotary calculator was the current technology, with the electrically driven variety considered very modern!

To come to the point, I would dearly like to use some of the programs in the yellow pages, but have absolutely no idea of how to begin to enter such programs into my computer. For instance, how do I open the procedure? And what are listings?

Forgive my ignorance, but sitting in my 'den' experimenting can be extremely frustrating with nobody to turn to for an answer to what I feel sure must be a simple question.

John Humby
Rayleigh

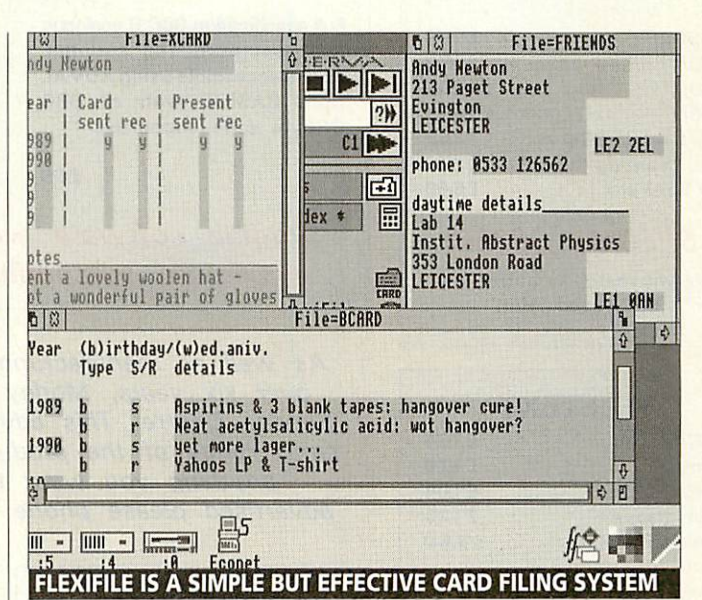
The desktop hides the part of the Archimedes that most resembles its eight-bit cousins, being the Basic language. To access it press F12 and type BASIC.

A Basic program or listing, as seen on the yellow pages, consists of lines and each one contains one or more instructions. Every line has to have a line number so, to enter this short program:

```
10 PRINT"Hello"
```

you would type it as shown and then press RETURN. The program can now be listed by typing LIST, and executed by typing RUN – try it. You can also save and load programs with SAVE"<filename>" and LOAD"<filename>", so you don't have to re-type it each time you need it.

Of course, most programs are much longer than this but the principle remains the same. To save you typing in the line number each time, typing AUTO will increment the line number by 10 each time you press RETURN. You have to press ESCAPE to stop auto-numbering. Keep reading our First Steps series, which will touch on the subject in more detail soon.



FLEXIFILE IS A SIMPLE BUT EFFECTIVE CARD FILING SYSTEM

PEN PAL

I am a student of the department of Astrophysics at Vilnius University in Lithuania. It is difficult to imagine theoretical astrophysics without using computers. Regrettably, personal computers are not available in this country or the USSR. Also it is impossible to purchase them directly from abroad because of state currency control.

Fortunately, a friend of mine from Canada gave me a BBC, but there is no information available on BBC hardware or software here, so I am still in the dark. Occasionally, I can get hold of *BBC Acorn User,* but would like penpals to exchange ideas and comments about software and hardware.

Kriukelis Saulius
Lithuania

If anybody out there is interested in contacting Kriukelis, you can write to him c/o *BBC Acorn User.*

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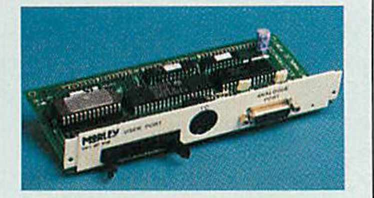


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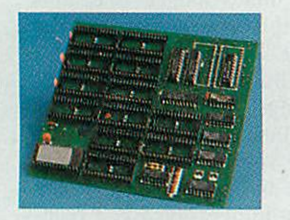
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BBC / MASTER SCSI DRIVES



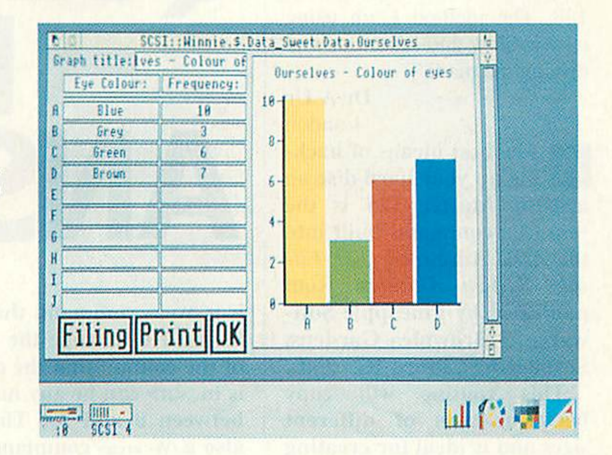
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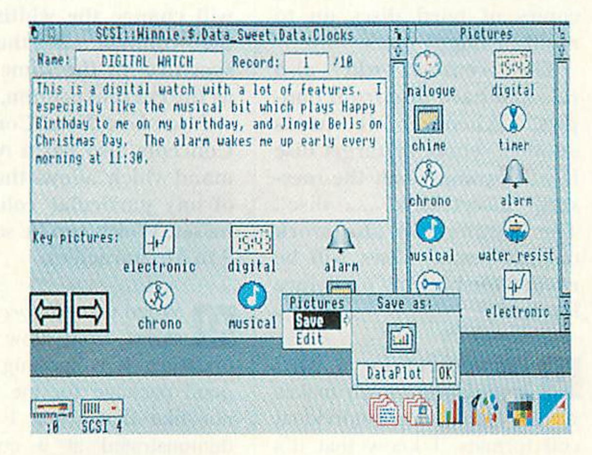
DataSweet

DataSweet is a Risc OS desktop package especially written to develop children's data handling skills. Each application may be used progressively from basic graph drawing to full database searches and spreadsheet calculations. Each application has been written to facilitate delivery of the National Curriculum and its guidelines on data handling.



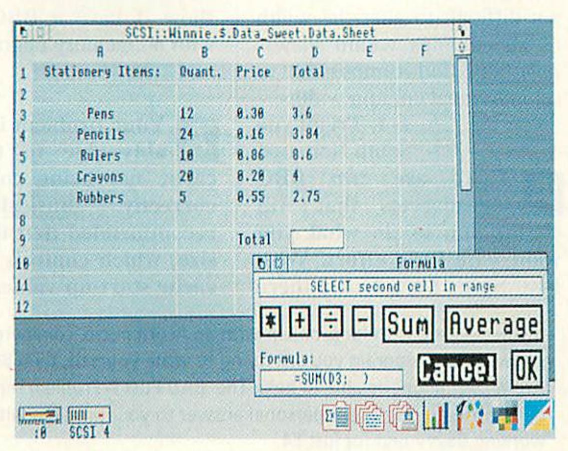
DataPlot is a simple to use graph drawing program, that integrates with the rest of the suite by importing data files created by other applications and displaying the information graphically.

DataCard is a card index database that allows text to be entered into a free text field, with up to 6 keywords. The keywords can be searched on and exported to DataPlot.

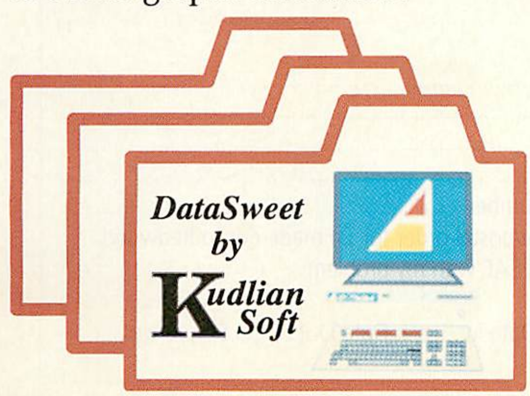


DataPick is similar to DataCard, with the added feature of 'key pictures' instead of keywords. New pictures may be imported, by dragging into place from their windows.

DataFind is a more sophisticated database which introduces the concept of fields within records. Files created in DataCard may be imported into DataFind.



DataCalc is an introduction to using spreadsheets. Columns of data may be imported from all the other applications in the suite, and be exported to DataPlot to obtain graphs and charts.



For further information, contact: Hampshire Microtechnology Centre, Connaught Lane, Portsmouth, PO6 4SJ. Telephone: (0705) 378266
E-mail 01:YDO059

- *Single School Site Licence: Secondary £80, Primary £30*
- *Area/Group Site Licences: Secondary £30, Primary £6*



QUESTIONS AND ANSWERS

Q There must be an easier way to back up my Viglen 28Mb hard disc attached to my BBC Master 128. The method I am using now is slow and laborious and driving me mad!

Dr A Ur
London

A **The best means of backing up your hard disc on a BBC Master 128 is the *BACKUP command built into the *ADU Advanced Disc Filing System Utilities* Rom published by Pineapple Software, 39 Brownlea Gardens, Seven Kings, Ilford IG3 9NL.**

This routine will copy between discs of different sizes and is ideal for creating copies of hard discs on to multiple floppy discs.

The routine will also reload a hard disc from floppies. Whenever it needs another source or target disc it will prompt with the message 'insert new ...... disc'. The routine will also work out how many discs will be needed for backing up before it starts.

Q I'm looking for a BBC spreadsheet which makes it easy to change individual cell formats. I know that it's not difficult to alter the width of all columns within *Viewsheet* but I find it impossible to set individual column widths.

D L Tremayne
South Norwood

A **There are two BBC spreadsheets that will enable you to do what you want with little effort. With BBC Soft's *Ultra Calc 2* there is a /W<n> command that can be used to change the width of the column that the cursor is in. <n> can be any number between 0 and 39. There is also a /W<area> command that will change the width of all the columns in the area specified to the same width as the current column.**

***Intersheet* from Computer Concepts also has a /W command which allows the width of any particular column to be set. Width can be set from 3 to 31 characters.**

Q When using *Impression,* I suffer from slow screen updating. It is spoiling a very good package for me. It was not like that when I saw it demonstrated at a computer show. I have a BBC A3000 with no memory upgrade.

V Herd
Norwich

A **Your problem is invariably due to the font cache not being configured correctly. Basically it is recommended that the Fontsize, which controls the font cache start-up value, be configured to at least 48K. This is done by pressing F12, typing *CONFIGURE FONTSIZE 48K and pressing RETURN.**

Q I have a BBC Master 128, with various add-ons. I am experiencing difficulties with the use of the *View* wordprocessor and the *SpellMaster* Rom when operating with the 65C102 co-processor.

Everything seems to work fine if I have the co-processor switched off. Could there be a fault with my system? Or do I need a different spellchecker?

R B Lee
Sheffield

A ***SpellMaster*, like a number of Computer Concept's mega-type Roms, is not compatible across the tube. This is due to Rom code problems, although a number of dual language Roms, like Acornsoft Logo, will run across the tube.**

You should have no problem using *Viewspell* when using the second processor *View* wordprocessor. But it is rather poor in comparision with *SpellMaster* as it has a disc based dictionary.

You may find the answer is to foresake the second processor and use shorter files linked together by the continuous processing concept.

I find *Wordwise Plus* and the Norwich Computer Services CP-Rom outstanding.

Q I have recently become the owner of a second-hand BBC Master 128, having moved up from an Electron.

I now wish to transfer and use my Electron software on the new machine.What guidance can you offer?

K J Bruce
Fareham

A **As you may know, the Electron is broadly compatible with the BBC model B and Master 128, although it is a slower computer and lacks some of the graphics capability and mode 7 of the BBC range.**

You will find that games run faster on the Master 128 but some Electron programs may not run at all on the Master as they will have been protected so that they look for Electron hardware.

However, programs will work alright from cassette. It will of course help if you transfer them to disc.

There are a number of tape to disc utility programs that can help.

Clares markets something called *Replica 3* and it costs about £13. Alternatively, Watford Electronics sells a Rom based program that considerably helps with tape to disc transfer.

If you have a particular problem with an Acorn micro, commercial software or a program you are trying to write yourself, then BBC Acorn User might be able to help. The BAU Post A Problem service guarantees to give you a personal answer to your problem within 10 working days – and for just £4.
Write out your problem with as much detail as possible and, if a program is involved, include a disc or cassette. Fill in the coupon and send it and your problem along with a cheque or postal order for £4 (including VAT) made out to Redwood Publishing. If you require recorded delivery, please add the cost of this.
Please note that debugging readers' own programs or those from other magazines is a complex task and we cannot guarantee to give a full solution. Unless the problem can be spotted quickly, the Post A Problem service will only be able to make general comments.
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Q I am having great difficulties with intermittent faults with a Cumana 40-track disc drive which I use with my old faithful BBC system. My machine is expanded to the limits with shadow Ram and a sideways Rom board. The drive is being operated from the BBC via the computer's internal power supply unit.

I am hesitant to send it to England for repair. Can you make any suggestions to help me find the fault?

K G Vergis
Malaysia

A I have a feeling that one possible cause of your problem is that you are running the disc drive from the BBC's internal power supply. This is frequently the cause of the intermittent faults, when a BBC micro has been expanded with a Rom board full of Roms. Although it is possible to run a disc drive from the BBC's internal PSU it does at times strain the PSU to the limit.

Your BBC computer is now quite old and the PSU could be finding it difficult to provide the power it was initially designed to and this would lead to power surge or lack of sufficient power. I suggest you consider running your drive from another power source and you will probably then find it functions correctly.

Q At work they are having a clearout of some older IBM PC disc drives. What is the possibility of connecting these up to the BBC systems at my children's school?

Tom Perry
Stilton

A It should be quite feasible to use IBM style 5.25inch drives or 3.5inch drives with the BBC micro. You will probably have to replace the ribbon cable with one like the BBC uses.

Your local Acorn dealer should be able to supply the connectors and the ribbon cable. If not, I recommend you contact Clarke Computer Services, Abacus Business Centre, Manor Road, Ealing, London W13 0AS. You should find help there.

Q I've just purchased a secondhand BBC computer. I am a little confused about all the ports the machine has. Can you give be a brief explanation of what they all are and what they do?

D J Miles
Cardiff

A The details of the BBC micro ports are:
The user port: This uses port B of the User 6522 VIA chip. It is used for control purposes such as the running of robots, interface boxes and attaching such peripherals as keyboards.

The 1MHz bus: The Acorn teletext adaptor used this port. In addition, standards have been set to enable this bus to allow 64K of address space to be accessed as well as 255 bytes of direct access ports. PMS and a number of other companies have developed silicon style Ram extension devices that used this port.

The tube: To enhance the computing power of the BBC micro, Acorn has developed a two processor architecture. The host processor (the BBC micro) performs most of the I/O routines whilst the second processor provides raw computing power. The tube provides the means for the processors to communicate with each other.

Q I have some difficulty understanding some of the bits and pieces connected with the BBC model B I have just bought secondhand. Inside there seems to be an extra board fitted with the name sideways on it. Can you tell me what this board does?

K R Edmunds
Enfield

A The additional board you have fitted is probably the sideways Rom expansion board. It is one of the better produced add-on boards and has been highly recommended.

It is used for holding additional sideways Rom chips which hold programs like wordprocessors, spreadsheets, graphics packages, utility programs and extra computer languages.

ACORN CUSTOMER HOTLINE

● For those of you who have wondered, yes it is possible for the mouse, supplied with the Archimedes and BBC A3000 computer systems, to be used with the PC emulator. This requires your DOS disc to contain the file: mouse.sys

The PC emulator is not supplied with this file as it is normal for any Microsoft package, which supports the mouse, to contain a suitable mouse driver.

If your DOS disc does not contain this file you will have to copy it, from the software package on which it was supplied, onto your DOS disc.

Once you have the file on your DOS disc you will have to amend the config.sys file with the following line:

device=mouse.sys

● We are currently receiving a number of enquiries regarding the use of standard resolution monochrome monitors on Archimedes 400 series systems.

The Archimedes 400 series contains two links which configure the system between high resolution monochrome and standard resolution monochrome.

As supplied from Acorn the links are set for high resolution. On the old 440 the links that need to be set are 13 and 14. Spare shunts to put on these two links can be found on PL2.

On the 400/1 series the links that need to be set are 5 and 6. Spare shunts to go on these links can also be found on PL2.

The cable from the monitor should be connected to the socket labelled 'Sync' on the rear of the machines, not to the socket labelled 'Video'.

● Many schools have been enquiring about which Acorn computers the Level 4 Fileserver software will run on.

Level 4 will run on any Acorn Archimedes system (including the 310 and 305 systems when upgraded to 1 MByte of Ram) or BBC A3000 system. All you need on the systems is a suitable storage media such as a hard disc.

● Since the addition of 2400 (still supporting 1200/75) baud modems to the SID PSTN lines, the usage via this route has significantly increased. In light of this we have increased the amount of software available via this route. SID can be accessed by the PSTN on Cambridge (0223) 243642. You will need viewdata terminal software set to, 7 data bits and even parity.

Just a quick reminder that SID Prestel access is available. Type *SID# from within Prestel and you will automatically be routed through to SID.

● If you have imported a 256 colour sprite into Acorn Desktop Publisher and then attempt to print the document when not in a 256 colour mode the message 'Invalid number of output bits (print cancelled)' will be reported. The answer is to use the palette icon to change to a 256 colour mode such as 15 before attempting to print.

● Acorn distributor, Kelator, is being integrated into the Bonsai group, which has been given the Acorn distributorship. Dealers wishing to contact the group should call its new Acorn hotline on 081-1399.

And, in the Netherlands, the Acorn distributorship has been awarded to ECD Computers Delft BV, tel: 015-147643.

● May I take this opportunity to remind you of the best way to obtain technical support.

In the first instance you should try your local dealer – a full list is available from Acorn Customer Support. If this fails, then please feel free to write to Customer Support. In both instances, please provide as much information as possible on the problem, such as the version number of the software you are using.

Obviously, if you have a SID ID, then you will get a faster response by using the technical mailboxes (which are accessible by registered SID users no matter which access route is used) provided for that purpose.

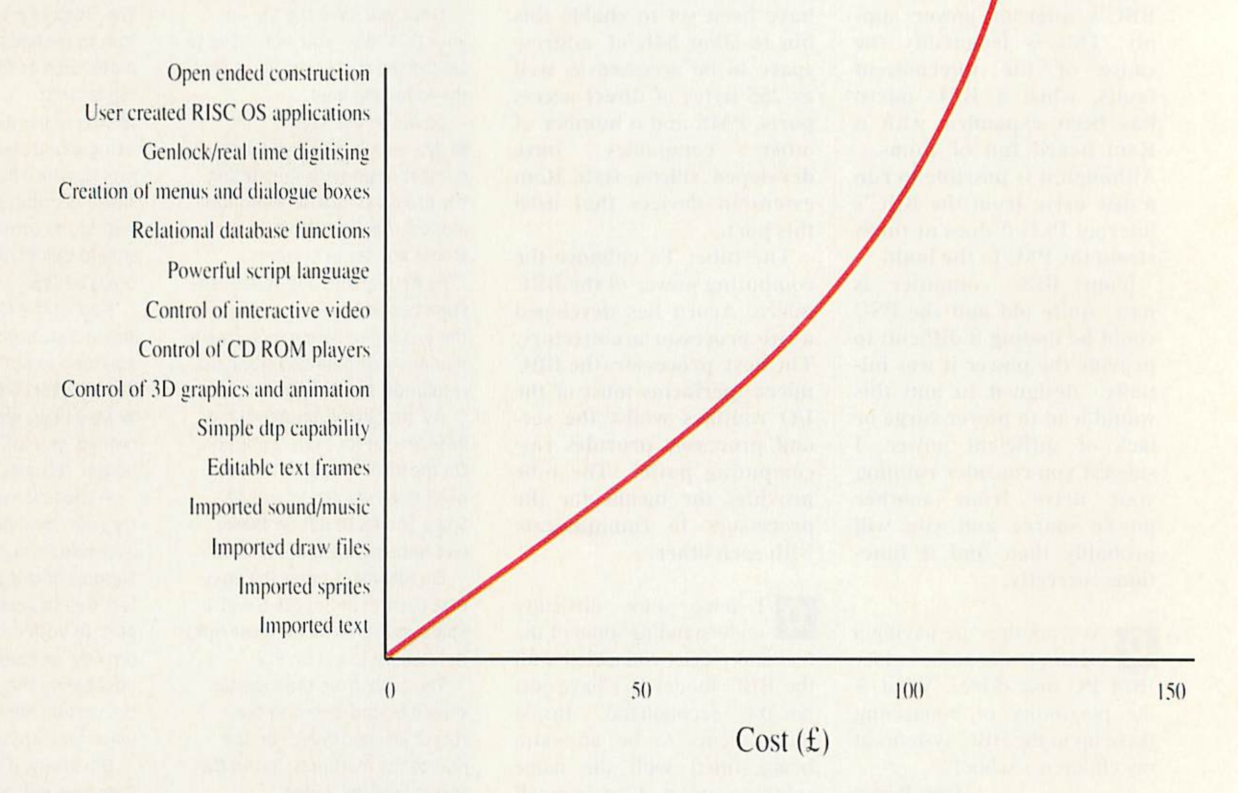
If you try to obtain technical assistance from your dealer, and he is unable to help, please inform us in your letter which dealer you contacted for assistance.

If you do need to contact Acorn in writing, the correct address to write to is: Customer Services, Acorn Computers Limited, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN.

Genesis II

Open Ended Multi-Media

Genesis II is designed to meet the requirements of the non-technical computer-user without alienating the professionals and the computer buffs. Genesis II is an ideal tool for all users at any stage of their development. The user interface has been implemented in such a way that even young primary school children find Genesis II easy to use. But as their skills develop, they will not find the package wanting, with Genesis II systems as diverse as multi-media authoring to factory 'quality control' data logging already being in place only 2 months after the product was launched.



Software that grows with you

To qualify for upgrades, please return your original Genesis 'Editor' disc to Oak Solutions at the address below.

Upgrade price £52.00 RRP

Genesis II £130.00 RRP

Please add £1.00 to cover P&P. Prices exclude VAT

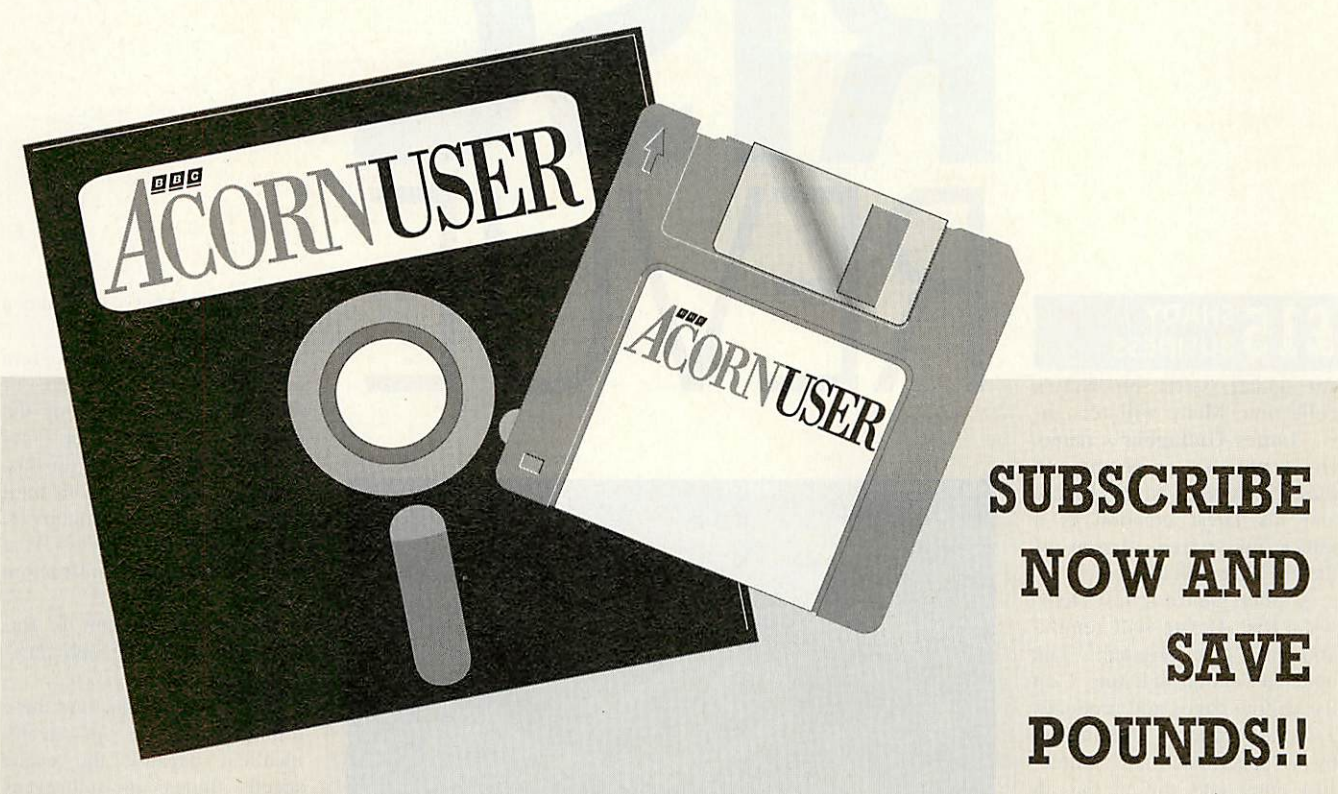
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£15 SHADY BUSINESS

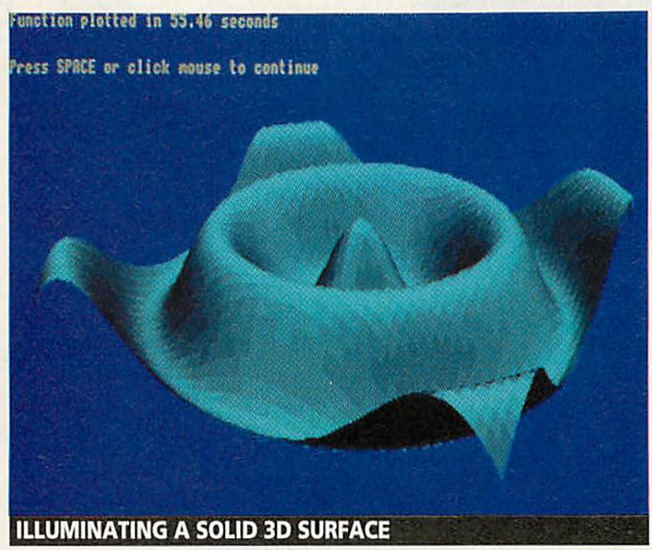
An update starts off May's collection. Many will recognise **James Gallagher**'s name. His code has appeared on these hallowed pages before and his latest creation is a rather impressive version of the old 3D graph number.

A quick glance at last October's Risc Revue will remind you of the original. The updated version is listing 1 on the yellow pages and produces a 'solid' surface, illuminated by a specified light source. Just enter and run it. On an Arm 2 machine the plot takes about 40 seconds – Arm 3 machines take about 20.

You can vary the way in which the function is plotted by altering one or more of the variables defined at the start. The array view_from() contains your position as the viewer. If you change the last parameter from 8 to -8 for example, you will see the underside of the graph. The arrays light_from() and light_to() determine the direction of the source of illumination.

Try changing light_from() to -1,1,3 for a different effect. The resolution of the graph is set by xpoints% and ypoints%. Doubling the values of these to 120 will significantly increase the quality of the image (and the plotting time!)

The actual function plotted is defined by FNz at the end of the listing. Currently it is COS(2.5*r) where r is the distance of the point (x,y) from the centre of the graph. Obviously you can plot any functions that are continuous over the area displayed. As an alternative try changing the final line of FNz to =EXP(SIN(r)/r).



ILLUMINATING A SOLID 3D SURFACE

Plotting takes place within two nested loops at the end of PROCplot_function. Each segment is plotted as two triangles after PROCshade has been called to find the appropriate colour for the surface using some hefty matrix arithmetic. Indeed, anyone wanting to use the matrix facilities of Basic 5 would do well to look at James' program.

LINE UP AND BE COUNTED

A curious feature of Arm programming is that sometimes when you do something which should speed your program up it actually slows it down! Typically you might remove an instruction, or replace one with another. What should result in an increase in performance may have no effect, or even make things worse.

Simple eight-bit processors like the 6502 behaved fairly predictably in terms of timing. You could rely on a particular instruction taking a known number of 'cycles' in which to be executed.

Occasionally when a page boundary (256 bytes on a 6502) was crossed, an extra cycle would be introduced, but by and large you knew where you stood. On the Arm things are rather more complicated.

The 'alignment' of an instruction (that is, its position within a four-word block of memory) can have a dramatic effect on its speed of execution. This is because the memory controller chip, MEMC, has the habit of 'stretching cycles'. Listing 2 illustrates one of the ways in which alignment can make a difference.

When run, the program assembles a short piece of machine-code at each of the possible alignments. The function FNalign is used to do this, inserting null instructions until P% is at the correct alignment. At the heart of the test is a tight loop, the first instruction of which is a LDR.

When the program is finished, timings for each possible alignment are given.

On an Arm 3 machine these timings will be practically identical because the cache speeds things up and evens them out. With an Arm 2 though the code runs about 10 percent at alignment 1!

Generally speaking, if an instruction at alignment 2 is executed this will take an extra cycle than normal unless the previous instruction was of a specific group.

In this group are LDR, STR, LDM, STM and the multiply instructions MUL and MLA. Matters are made even more complicated by the Arm chip 'pipelining' (dealing with more than one instruction at the same time) but as a general guide, putting these special instructions at alignment 1 can save some time.

Although Arm code is generally relocatable and may therefore appear at any alignment, it is usually possible to ensure your program is at the optimum position in memory. Obviously code assembled in Basic may be hand-aligned like listing 2. Relocatable modules in Ram always begin at alignment 1 (type *MODULES to confirm this!) and so you can take this into account when assembling them.

SPACE STAR

Dave Lawrence supplies us with a splendid 3D 'star-field'. It's listing 3 on the yellow pages. Move the mouse left and right to rotate your spaceship; move it up and down to alter your speed.

The number of stars whizzing past is set at the start. Aside from memory limitations, the number the program can cope with is pretty big, although with more than 512 or so the effect begins to be lost, even though the code races on regardless.

So that rotation is possible, star positions are stored as angles and distances rather than (x,y) co-ordinates.

Two simple look-up tables (sintab and costab) are used to work out where each star appears on the screen.

As soon as a star moves out of view it is reset to a random position in the middle. To enhance the effect of movement, stars become brighter as they come nearer.

This effect is achieved by taking the star's distance from the centre and using it to look up a colour in a table.

One feature of Dave's program that might be of interest to those new to Arm code is the random number generator rnd. On the Arm just two instructions are enough to generate a 'pseudo-random' bit:

```
MOVS seed,seed,ASL #1EORCS seed,seed,xor
```

The value of seed can be 'randomised' by setting it to TIME as in listing 3. The number xor is a special constant. The value &1D872B41 is suitable. To generate larger random numbers the pair of instructions above is simply repeated the required number of times, as in Field.



IT'S A STRING THING

Incidentally, look out for Dave's serendipitous and psychedelic 'Whirlpool' – it was the original version of the star-field but something went a little wrong...

TIME PIECE

Sometimes it is necessary to wait for a short period of time within a program. If this period is anything less than a centisecond, the standard OS clock is not much use. There are however two timers in the input/output chip which tick at two million times per second. (In fact, the I/O supplies four counters but two of them are taken up with other duties). One of the two 'proper' timers is used by Risc OS but the other is free. Listing 4 illustrates how to go about using it.

There are four addresses that are relevant to the timer – the low and high bytes of the timer itself (it is a 16-bit clock), a 'go' location and a 'latch'. The I/O chip appears at location &3200000 in memory and the timer registers are accessed as offsets from this base. Note that you have to be in supervisor mode before you can talk to I/O – hence the SWI "OS_EnterOS" at the start.

To set the timer going, write the low and high bytes of the start value into the appropriate location. Then write any value into the 'go' address to start it ticking. The timer counts down at 2MHz. Read the current value by writing any value into the 'latch' address and then loading the low and high bytes in the usual way.

The example given counts down from 1000 a total of 2000 times – about a second of delay in total. Note that the program doesn't actually wait for the counter to reach zero but to fall below 10. This is to compensate a little for the fact that you can't actually read the counter as fast as it is descending.

£5 PD TIPS

If you're running short of memory, **Simon Burrows** of Stoughton points out a way of saving 100K or so. Printer drivers such as *PrinterDM* consist of a relocatable module (which does all the work) and a front end which can be 'killed' to free valuable memory. Simply load the driver in the usual way, set up the necessary options from the menu (page size, etc) and then quit the application. The module remains and is all that is needed for printing.

Another tip we had a long time ago but is worth repeating applies if you only want to print out simple text files. Rather than go to the trouble of loading a printer driver, simply enter the following command at the star prompt:

```
*Filer_OpenDir Printer:
```

and a window called Printer: will appear. This is a directory viewer like any other, except all files dropped on it will disappear straight to the printer! The same can be done with the serial port (*Filer_OpenDir Serial:).

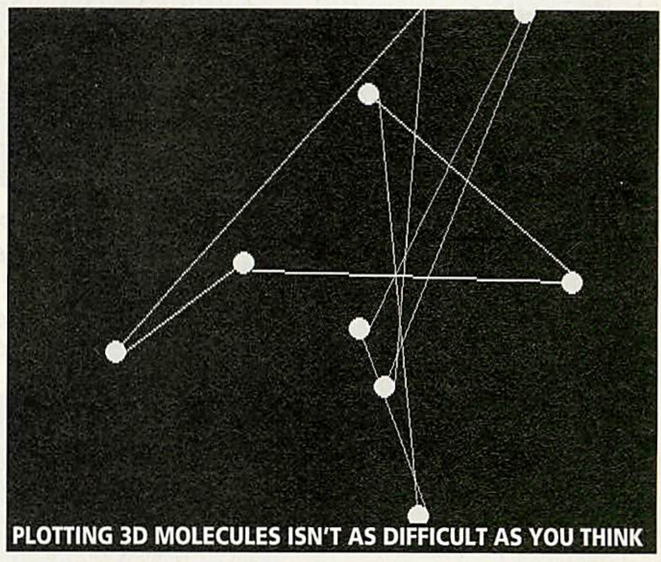
Finally, if you're writing a Risc OS application and want to check if a printer driver is loaded, there is a simple test. Printer drivers are called by applications using SWIs such as "PDriver_PageSize".

Unfortunately, if the driver isn't loaded, an error will occur if you try to use one of these calls – even if you precede the SWI name with an 'X'. The solution is to use the following lines in your program:

```
SYS "XOS_SWINumberFromString",,"PDriverPageSize" TO ;ok%
ok%=(ok% AND 1)=0
```

The value of ok% is TRUE or FALSE depending on whether a driver is loaded.

The idea is to convert a known printer SWI name into a SWI number. If the driver isn't loaded, the V bit is set on exit from OS_SWINumberFromString and this emerges as the lowest bit of ok%.



PLOTTING 3D MOLECULES ISN'T AS DIFFICULT AS YOU THINK

£15 ONE LINERS

We round off this month's collection with two excellent one-liners from **David Walters** of Torquay. You'll find them as listings 5 and 6 on the yellow pages.

The first is a sort of 3D rotating molecule and as David points out, it illustrates the fact that plotting in three dimensions isn't always as complicated as you might think.

The second he calls *String Thing* (I'm still not quite sure how it manages to work in just one line.) Use the Basic Editor to type them in – and no cheating and splitting them onto several lines either.

DO YOUR BIT...

All programs, ideas, hints and tips most welcome. Send them to: Risc Revue, *BBC Acorn User*, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. Don't spend all your time watching *Neighbours* on the TV – write us a program instead! Fair dinkum and all that.

Dave Acton

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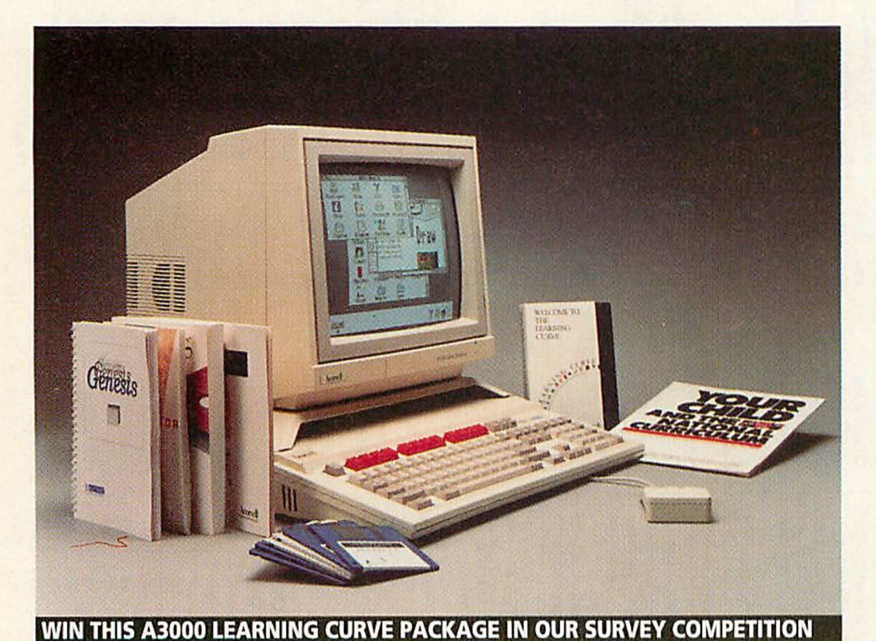
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A3000 LEARNING CURVE MUST BE WON!

HELP US to HELP YOU

Complete the BBC Acorn User reader survey questionnaire and tell us what you want to read about (or not read about) in the magazine. Your idea could help you win a BBC A3000 Learning Curve package



WIN THIS A3000 LEARNING CURVE PACKAGE IN OUR SURVEY COMPETITION

What do you like about *BBC Acorn User*? Is there anything you don't like? What would you like to see in the magazine? These and other questions are included in our 1991 reader survey, which you can find on the following two pages. You can help us to help you by filling in the questionnaire and telling us about the sort of editorial content which would be of most value to *your* computing. So whether you are involved in education, or do your own programming, or use your machine to play games, we want to hear from you.

It doesn't matter which machine you use, whether it is a BBC B, a Master, an A3000 or an Archimedes. We want to find out how useful you find the magazine and what improvements (if any) you would like to see. Even if you do not currently own an Acorn machine, we would still like to hear your views.

The survey will be analysed by computer, but each questionnaire will be kept completely confidential. Most of the questions merely require you to tick appropriate boxes.

As an added incentive to completing the survey, we are offering you the chance to win an Acorn Learning Curve package, which includes a BBC A3000, a colour monitor and software.

To enter the survey competiton, all you have to do is put forward an idea for an article or program that you think would be of interest to our readers. The idea does not have to be complicated – as long as it is original and appeals to users of both eight-bit and 32-bit Acorn machines. We are not looking for reams of detail, nor even a working program – it is the essentials of the idea that we are interested in.

Please complete the survey and either cut it out or photocopy it and send it to:

BBC Acorn User Reader Survey
Redwood Publishing
20-26 Brunswick Place
London N1 6DJ

Entries must reach us by May 31 1991.

FILL IN OUR SPECIAL READER SURVEY>>>

BAU READER SURVEY 91

1 Are you:

01❑ Male? (10)
02❑ Female?

2 What is your age group?

01❑ Under 16 (11)
02❑ 16-24
03❑ 25-34
04❑ 35-44
05❑ 45-54
06❑ 55 or more

3 What is your occupation?

01❑ Student at school (12)
02❑ Student at college/university
03❑ Teacher/lecturer
04❑ Research and development
05❑ Self-employed small business
06❑ Health/welfare
07❑ Media/creative
08❑ Computing/electronics
09❑ Engineering
00❑ Other professional
01❑ Managerial (13)
02❑ Admin/clerical
03❑ Manual/tradesman
04❑ Uniformed services
05❑ Unemployed
06❑ Other

4 What micro(s) do you own or use regularly?

At home	At work	
01❑	02❑ BBC model B	(14)
01❑	02❑ Electron	(15)
01❑	02❑ Master128/Compact/	(16)
01❑	02❑ Master 512	(17)
01❑	02❑ Archimedes 300 series	(18)
01❑	02❑ Archimedes 400 series	(19)
01❑	02❑ BBC A3000	(20)
01❑	02❑ Archimedes A540	(21)
01❑	02❑ Other	(22)

5 Which of the following do you own or intend to buy in the next 12 months?

Own	Intend to buy	
01❑	02❑ Disc drive	(23)
01❑	02❑ Hard disc	(24)
01❑	02❑Dot-matrix printer	(25)
01❑	02❑ Laser printer	(26)
01❑	02❑ Normal monitor	(27)
01❑	02❑ Multisync monitor	(28)
01❑	02❑ Mouse	(29)
01❑	02❑ Beeb sideways Ram	(30)
01❑	02❑ Arc expansion Ram	(31)
01❑	02❑ Modem	(32)
01❑	02❑ MIDI music equip.	(33)
01❑	02❑ Hybrid music equip.	(34)
01❑	02❑ Other	(35)

6 What do you mainly use your micro for? (You may tick more than one box)

01❑ Programming (36)
02❑ Learning about computers
03❑ Computer games
04❑ School or college work
05❑ Teaching own children
06❑ Teaching at school or college
07❑ Home or personal affairs
08❑ Business
09❑ Club or society administration
00❑ Office work at home
X❑ Other

....

7 What are the main applications you use your micro for? (You may tick more than one box)

01❑ Accounting (37)
02❑ Adventure games
03❑ Arcade games
04❑ Computer aided design
05❑ Communications
06❑ Databases
07❑ Desktop publishing
08❑ Control/monitoring
09❑ Graphics/art/design
00❑ Home education
01❑ Music (38)
02❑ Research
03❑ Spreadsheets
04❑ Teaching
05❑ Your own programming
06❑ Wordprocessing
07❑ Other

....

....

8 What disc system do you use? (Please tick as many as applicable)

01❑ 5.25in 40-track (39)
02❑ 5.25in 80-track
03❑ 3.5in Master
04❑ 3.5in A3000/Archimedes

9 Where do you usually buy your hardware and software?

01❑ High Street store (40)
02❑ Mail order
03❑ Official Acorn dealer
04❑ Other

....

10 Estimate your personal software spending over the last/next 12 months

Last year	Next year	
01❑	02❑ Less than £20	(41)
01❑	02❑ £20-£49	(42)
01❑	02❑ £50-£99	(43)
01❑	02❑ £100-£299	(44)
01❑	02❑ £300-£499	(45)
01❑	02❑ Over £500	(46)

11 Estimate your personal hardware spending over the last/next 12 months

Last year	Next year	
01❑	02❑ Less than £20	(47)
01❑	02❑ £20-£49	(48)
01❑	02❑ £50-£99	(49)
01❑	02❑ £100-£299	(50)
01❑	02❑ £300-£499	(51)
01❑	02❑ Over £500	(52)

12 What product area(s) do you want to see covered by BBC Acorn User reader offers?

....

....

....

....

13 How many orders from BBC Acorn User reader offers have you made in the last 12 months?

01❑ None (53)
02❑ 1
03❑ 2-5
04❑ More than 5

14 If a disc full of programs was attached to the magazine, how much more would you be prepared to pay for it?

01❑ 50p (54)
02❑ 75p
03❑ £1
03❑ No more

15 Which disc size would you prefer to receive with the magazine?

01❑ 5.25in (55)
02❑ 3.5in

16 How do you usually obtain your copy of BBC Acorn User?

01❑ By subscription (56)
02❑ Regular newsagent's order
03❑ Buy it every month
04❑ Buy it regularly
05❑ Read someone else's copy

17 How long have you been reading BBC Acorn User?

01❑ Less than three months (57)
02❑ 3-6 months
03❑ 7-12 months
04❑ More than one year
05❑ More than two years
06❑ Since before 1984

18 Which of the following do you buy or read regularly? (You may tick more than one box)

01❑ BBC Acorn User (58)
02❑ Micro User
03❑ Archimedes World
04❑ Beebug
05❑ Risc User
06❑ A&B Computing
07❑ Archive
08❑ Educational Computing
09❑ Personal Computer World
00❑ Computer Shopper

19 Do you read the advertisements and inserts in BBC Acorn User?

01❑ Some (59)
02❑ Most
03❑ All

20 Have you bought mail order products from advertisements in BBC Acorn User?

01❑ No (60)
02❑ Occasionally
03❑ Often

21 If you do buy from BAU advertisements, from whom would you order products by mail order?

01❑ Any advertiser in BAU (61)
02❑ Only regular BAU advertisers
03❑ Only well-known industry names

22 How would you rate the following features in BBC Acorn User?

	Very useful	Quite useful	Useful	Not useful	
News	01❑	02❑	03❑	04❑	(62)
Education Column	01❑	02❑	03❑	04❑	(63)
Music Column	01❑	02❑	03❑	04❑	(64)
Comms Column	01❑	02❑	03❑	04❑	(65)
PC Column	01❑	02❑	03❑	04❑	(66)
Eight Bits	01❑	02❑	03❑	04❑	(67)
Risc Revue	01❑	02❑	03❑	04❑	(68)
Questions & Answers	01❑	02❑	03❑	04❑	(69)
Readers' Letters	01❑	02❑	03❑	04❑	(70)
General Features	01❑	02❑	03❑	04❑	(71)
Program Features	01❑	02❑	03❑	04❑	(72)
Technical Features	01❑	02❑	03❑	04❑	(73)
Education Features	01❑	02❑	03❑	04❑	(74)
Software Reviews	01❑	02❑	03❑	04❑	(75)
Hardware Reviews	01❑	02❑	03❑	04❑	(76)
Games Reviews	01❑	02❑	03❑	04❑	(77)
End User	01❑	02❑	03❑	04❑	(78)
Reader offers	01❑	02❑	03❑	04❑	(79)
Competitions	01❑	02❑	03❑	04❑	(80)
Yellow Pages	01❑	02❑	03❑	04❑	(10)

23 How often do you type in the programs listed on the yellow pages?

01❑ Regularly (11)
02❑ Sometimes
03❑ Never

24 Given the choice, would you prefer to have programs on disc rather than listed?

01❑ Yes (12)
02❑ No

25 How much coverage of eight-bit BBC computing would you like to see?

01❑ More (13)
02❑ Less
03❑ About the same

26 How much coverage of 32-bit A3000/Archimedes computing would you like to see?

01❑ More (14)
02❑ Less
03❑ About the same

27 What subject areas would you like to see covered in the BBC Acorn User columns?

Comms
....
....

Music
....
....

Education
....
....

PC
....
....

28 Would like to see regular listings of available software in BBC Acorn User?

01❑ Yes (15)
02❑ No

29 Would you like to see regular listings of available hardware in BBC Acorn User?

01❑ Yes (16)
02❑ No

Finally, to qualify for the reader survey competition, we would like to hear your suggestion for an article or program which you think would appeal to our readers. Write your idea (in no more than 300 words) on a sheet of paper, attach it to this questionnaire and send it to: BBC Acorn User Reader Survey, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. Entries should arrive no later than May 31 1991.

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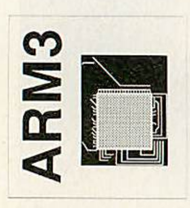
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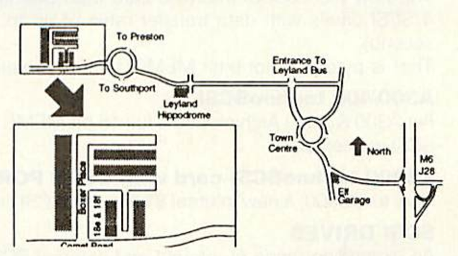
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Our 12" by 12" working area technoTablet offers a resolution of 1000 lines/in and connects through the serial port of the computer. The tablet can take over virtually all the functions of a mouse simplifying the use of graphics packages.
A four button puck moves over the special surface, its cross-wires allowing simple and accurate transfer of drawings. The optional stylus will make tracings, line drawings etc much easier and more accurate.
The driver software is genuine RISCware and provides commands to turn the tablet on or off, select relative or absolute coordinates, change puck movement sensitivity and scaling.
The package includes the tablet, puck, software and mains power supply, no connections are required to the ARC main board.

technoTablet **£209(a)**
including Stylus **£15(d)**
PC mouse drivers and art package **£12(c)**

What we offer in addition to efficient sales service and professional backup!

We not only offer professional advice when you are purchasing your system but we will also provide friendly assistance afterwards. All our products carry a 12 month full warranty for parts and labour.

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An Archimedes 420/1 with 2 MB RAM + 20 MB Hard Disc and
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NEW
Probably the definitive monochrome scanning package!

The all NEW technoSCAN II package provides full monochrome operation at 400 dpi as well as 8 and 16 level grey scale scanning and provides the following features:
Suitable for all Archimedes micros and integrates fully with the multitasking RISC OS environment.
Advanced memory management system releases memory when not required allowing scanning and DTP in a 1MB computer.
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Interactive help and a superb manual.
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Saves sprites direct into PAINT and DTP or to disc.
Saves sections and palettes into any graphics mode.
At the same low price as the well tested original.

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MULTIPOD PROFESSIONAL

The MultiPod is a single-width Podule for the Archimedes which incorporates five high-quality devices in one:

- **Video digitiser**
- **Sound sampler**
- **Analogue/joystick port**
- **RS232 serial port**
- **BBC Rom Sockets**

The software provided with MultiPod works in combination with the on-board Podule Manager to make an easy link with the familiar Risc Os Desktop environment. For most users this ought to provide sufficient control over the hardware features, but to accommodate advanced users several *Commands and SWI calls are supported. There are no Rom sockets in the A3000 version of the board.

MultiPod 300/400 series **£117(b)**
MultiPod for A3000 **£145(b)**
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That is bytes . . . not bits! MEMC1a bit is required. Supports tape streamers, scanners and laser printers.

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For A300 & A400 Archimedes a full 16 bit MEMC controller with tagged cache and both internal and external SCSI connectors **£179(b)**

A3000 technoSCSI card with USER PORT
Now for A3000, a new internal 8 bit technoSCSI card with on-board BBC compatible user port. **£179(b)**

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All drives are supplied with cables and external drives are housed in stylish but robust metal cases.

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Sigmasheet	£57(c)
Pipedream 3	£125(c)
Schema	£95(c)

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Clares Toolkit	£5(d)
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PC EMULATOR	£89(c)
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SID Utilities Disc 2	£5(d)
SID Utilities Disc 3	£5(d)
ChangeFSI new version	£10(d)
Snippet	£27(d)
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Starter Pack	£45(d)
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Backplane £45(b) FAN	£13(c)
AEDA external floppy drive adapter	£30(c)
External 5.25" 40/80 floppy drive	£90(b)

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techno HD Controller for 2 drives	£149(b)

Internal ST506 drives supplied with mounting bracket, cables & instructions.

20 Mb 40ms	£179(a)
40 Mb 25ms Autoparking	£259(a)
50 Mb 28ms (as A440/1)	£369(a)
External Drives see A3000 upgrades in 3rd column	
External HD Adapter Plate	£30(c)

SCSI Drives & Controller
as A400 Series in 2nd column

A300 & A400 SERIES

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MultiPod Filter Set for Video Camera (RGB)	£15(d)
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Stylus for tablet	£15(d)
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A400 SERIES

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External 5.25" 40/80 floppy drive	£90(b)

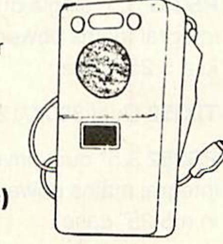
Hard Drives & Controllers
as A300 Series in 1st column

SCSI Drives & Controller

technoSCSI card	£179(b)
technoSCSI card with internal 40 MB Drive	£349(a)
technoSCSI card with internal 105 MB Drive	£799(a)
technoSCSI card with external 40 MB Drive	£399(a)
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50Mb 28ms (as A440/1), cased	£449(a)
For 300/400 please state drive 4 or drive 5	

SCSI Drives & Controller

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technoSCSI card with external 105 MB Drive	£899(a)
Acorn MIDI/User Port	£49(b)
MultiPod Video Digitiser/Sound Sampler	£145(b)
technoSCAN II Hand held Scanner	£175(a)
Wild Vision Chroma 220	£155(b)
Tracker Ball – new low price	£30(c)
technoTablet (needs serial upgrade)	£209(a)
Stylus for tablet	£15(d)
Serial Port Upgrade Kit	£19(c)

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PD400/PS351 are Compact/Archimedes compatible.
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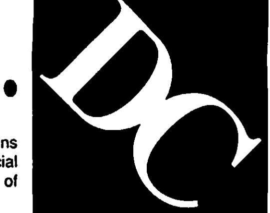
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Master 128 .... £369

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Archimedes / A3000 Games

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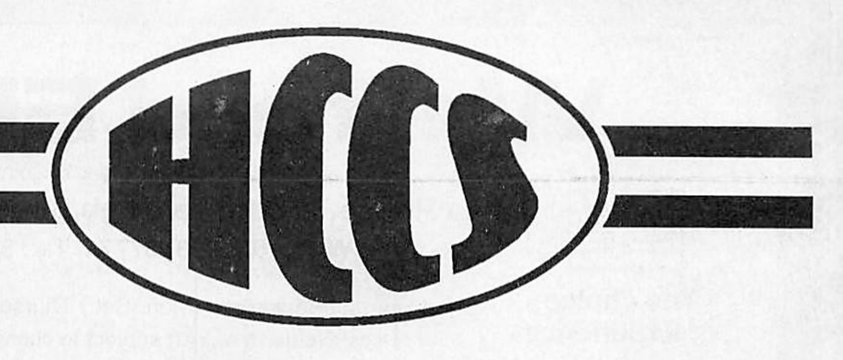


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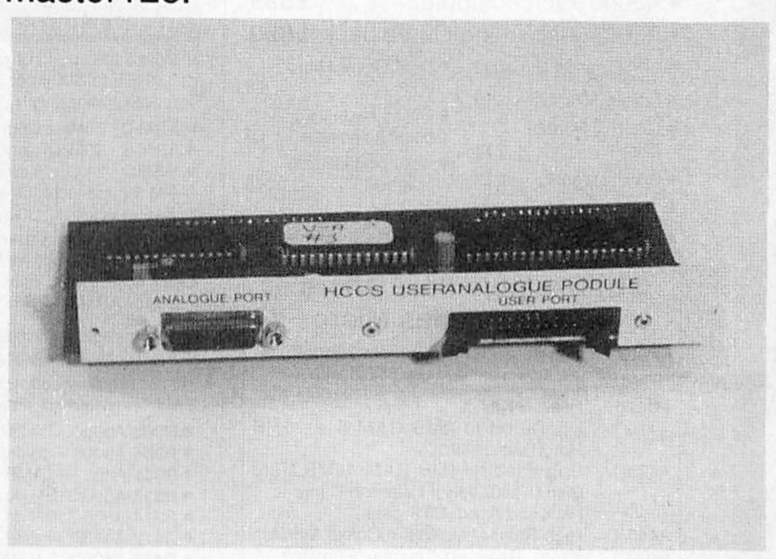
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User/Analogue Podule

HCCS have developed a podule for the Archimedes A3000 which provides two of the most popular ports found on the BBC B and Master128.

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A User Guide which covers commands, pin-out information and a few simple routines to control concept keyboards and joysticks is also included with every podule. If however you require a more in depth explanation of the uses of general control concepts and practical experiments then "Control on the Archimedes" is required reading. All of the application circuits featured in "Control on the Archimedes" written by Joe Telford, were tested on the HCCS podule.

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HCCS User/Analogue podule £44.00

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Watford's ST506 Hard disc drives for A310 & A410 series fit internally into the space provided. The 'simple to follow' fitting instructions supplied makes drive fitting very easy. All disc drives are auto parking. 40Meg & 53Meg drives are fast 24mS type, while 20MHz are 28mS.

P.S. A310 upgrades require a backplane and a fan.

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- Cops £14
- Corruption £18
- Drop Ship £15
- Enthar Seven £22
- E-Type £17
- E-Type Designer £15
- E-Type Extra 100 miles £15
- Holed Out Designer £15
- Holed Out Golf £15
- Hostages £15
- Ibix the Viking £14
- Inter Dictor 2 £26
- Iron Lord £17
- Jet Fighter £10
- Magpie £39
- Manchester United £19
- Nevryon £14
- Olympics £15
- Power Band £20
- Real McCoy £22
- Redshift £14
- Return to Doom £16
- Revelation £54
- Repton 3 £15
- Rotor £20
- Sporting Triangles £24
- Superior Golf £15
- Talisman £12
- The Pawn £19
- Thundermonk £11
- Trivial Pursuit £23
- Twin World £17
- U.I.M. £23
- White Magic £15
- White Magic 2 £15
- Wimp Game £15

Miscellaneous

- Ancestry £59
- Arccomm Pack £24
- Arcterm 7 £69
- Armadeus Sound £60
- BBC DFS Reader £6
- Genesis £65
- Genesis 2 £125
- Hearsay Comms Pack £50
- JX Archi Colour Printer Driver for Citizen & Star £15
- Numerator £66
- Rhapsody in Blue £39
- Toolkit (Clares) £42

LANGUAGES (Archimedes)

ISO-PASCAL; FORTRAN 77			£77 each
ANSI C Release 3			£125
Assembler; LISP or Prolog X			£149 each
LOGOTRON LOGO			£55
ROBO LOGO	£49	TWIN EDITOR	£25
RISC BASIC	£85	BASIC Compiler	£77

Minerva's Archimedes Software

Sigmasheet	£39	Sales Ledger*	£53
Home Accounts*	£36	Purchase Ledger*	£53
Stock Manager*	£53		
Nominal Ledger*	£53	Reporter	£29
Ancestry	£59	Mailshot*	£29
System Delta+	£55	MultiStore	£195
System Delta + Reference Manual			£25
Order Processing/Invoicing*			£53
School Administrator			£118

** Requires System Delta*

NEW Business Accounts Packages
Nominal Ledger, Order Processing/Invoicing, Purchase Ledger, Sales Ledger & Stock Control
Price: **£78** per Module or
£299 for complete package

ULTIMUM – Archimedes A3000 Podule Racking System



THE ONLY LOGICAL WAY TO EXPAND YOUR A3000 COMPUTER

The accepted standard for Archimedes computer expansion is the Acorn Podule, designed initially to fit the old 310, and also for the later A400 and A400/1 series micros. The podules fit inside these computers up to four at a time. The A3000 is the little brother of the family, but can only have one podule at a time, plugging into the back of the computer.

Other attempts have been made to expand the A3000 by trying to introduce a 'mini-podule'. This is impractical for many reasons, amongst which is the reluctance of manufacturers to produce them. Nobody wants to re-design podules already produced. Some cannot be produced on a 'mini-podule' as they are far too complicated and simply wouldn't fit.

Watford Electronics listens to the demands and requirements of its customers, and we are glad to say that we have come up with the only real solution to the A3000 expansion problem. The ULTIMUM Podule Racking System allows up to three FULL SIZE standard Archimedes 300/400 series podules to be fitted to the computer. In addition, there is also provision for a hard disc drive and a podule to be fitted internally.

Since the ULTIMUM Podule Racking System takes proper full size podules, you will be able to use any of the currently available peripheral equipment, from companies like Computer Concepts, Armadillo, Acorn and of course, our own brand.

Fitting the podules to 'ULTIMUM' is simple. They are neatly fitted inside the metal case of the rack, avoiding the previously untidy method of hanging the podule off the back of the computer, risking damage to both, it and to the computer.

'ULTIMUM' has its own power supply, so no strain is put on the A3000 power supply. There is also an IEC mains output socket for an Acorn type monitor so reducing the number of plugs required to go to the mains. The ULTIMUM is rigidly clamped over the top and under the computer, and allows direct access to the floppy disc drive and reset button, rather than obstructing access as on other systems. One can also place a standard monochrome or 14" colour monitor (even a multiscan type) safely on top. The mounting method employed is so firm that the computer could even be safely transported without the assembly falling apart.

Price: £125

Archimedes A300/A400 SCSI Hard Disc Offer
(while stocks last)

100MB Hard Disc Upgrade complete with Controller card, Cables, Formatter and Manuals

RRP: £1030
Offer Price: £499

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.
New RISC OS Version **Only £15**

Archimedes External Disc Drive Interface

With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. Fully Buffered Board. NO SOLDERING is involved. Supplied complete with necessary lead.
- A300/A3000 £21 • A400 £25

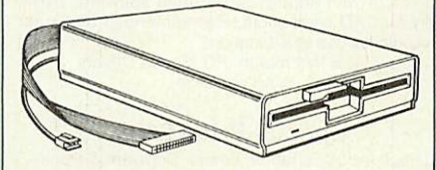
Special Education Prices

All education establishments qualify for special education prices on micros, etc. Please write in or telephone (0923) 37774 or 50335 for written quotation.

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) **£399** *(carr £7)*

FREE OFFER



A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.

FREE with every BBC Master purchased from us during April

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module			£115
Econet Module for the Master			£45
Twin ROM Cartridge for Master			£9
Quad ROM Cartridge for Master			£14
Master Reference Manual I			(No VAT) £14
Master Reference Manual II			(No VAT) £14
Master Advance Ref Manual			(No VAT) £17
64K Upgrade Kit for B+			£32
Acorn 1772 DFS Kit complete			£49
ECONET Upgrade Kit for BBC B			£42
ALL ECONET UPGRADES Available			
ARIES' IEEE Interface for BBC B & Master			£238
Morley Teletext Adaptor with ATS Rom			£99
Filestore E01S	£899	Filestore E40s	£749
Filestore E60S	£949	Ecolink	£270

(Carr. £2 to £7 depending on the weight)

0% Finance Now Available

On Acorn Archimedes A3000 and A420/1 with learning curve packs. (Please telephone for details)

Watford's Scottish Dealer

We are pleased to announce the appointment of Messrs Computer Depot as Watford's official Scottish Dealer. The full range of our BBC/Acorn products is now available from their Dundee, Edinburgh & Glasgow shops. Their technical staff will be very happy to discuss all your peripherals' requirements.

Commander Joystick

Watford Electronics' new Commander Joystick for the BBC B and Master 128K has a unique dual mode of operation giving selective free floating or self centring fully variable control in both X and Y axis directions. Commander is particularly good for flight simulation and drawing programs.

Features:
- Direct connection to BBC Analogue input port – no interface needed.
- Fully compatible with all BBC Joystick controlled games programmes.
- Switchable springs allow selection of floating or centring operation.
- Trim adjusters for both X and Y axes for fine centre adjustment.
- Convenient stick mounted fire button with additional base buttons.

Launch Price: £15

Quest Mouse Mk3

The latest Quest Mouse from Watford features an attractively designed and ergonomically formed three button mouse, with a very positive feel. It is extremely comfortable to use in the palm of ones hand. Mk 3 mouse is available for the BBC B and Master 128K. It is fully compatible with AMX and Quest softwares.
- Quest Mouse MkIII for BBC Micro £30
- Quest Mouse + Quest Paint £59

Archi Mouse Port Splitter

Continuous plugging and unplugging of the mouse is not only inconvenient but can also damage your micro. Our handy little Archi mouse port splitter unit eliminates this risk by allowing you to connect a mouse and a joystick or a tracer ball simultaneously to your Archimedes micro. The miniature slide switch on the box enables you to select the socket to be used. **£15**

Archimedes Education Software

- Advanced Folio: 7-14 years. Has the simplicity of a basic wordprocessor with the presentation quality of a Desk Top Publisher £38
- Colourcopter & Numbercopter: 4-7 years. Flying start in pre-reading and pre-number skills
- Colourcopter includes 7 programs to develop matching, sorting, coordination, letter & word recognition £28
- Numbercopter: Includes 8 programs to develop memory, sequencing, logic, number, move and gone away, word order and rhythm skills £28
- Concept Keyboard Podd 5-11 years: This concept keyboard version of Podd encourages less able and young children to join in the fun of discovering the 116 actions which podd can perform. Simple to operate £23
- Best Four languages 5-11 years: Four best selling programs which encourage children to work together to improve their linguistic ability £33
- Hands on Spelling 5-11 years: Promotes a visual approach to mastering spelling, linking the skill with other National Curriculum areas as hand writing, talking and reading. £30
- An Eye for Spelling 7-14 years: Manages and motivates children, learning to spell with individual attention. It uses Charles Cripps' visual approach to help reluctant spellers by encouraging them to look at the internal structure of words. £24

(More Educational software on page 10)

Continued→ → → → → → → → → →

Archi A4 Scanner



This new A4 image scanner from Watford Electronics is supplied complete with ROM based podule software. Features provided include facilities for zooming in on an image and inverting the image in X and Y directions, saving and printing of the sprite created. Interactive help is supplied using the !HELP application on the Acorn applications discs.
The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, diagrams, etc., with its fast ten page automatic document feeder, but it can also detach from the feeder to become a convenient hand-held full page scanner for larger documents or pictures.
Scanned image control can be freely adjusted in increments of 10 dots per inch from 100 up to 400 dpi resolution with 64 levels of grey scaling. A built in shading controller and manual brightness control achieve optimum image clarity.
Unlike some scanners, which use a red light source, the Watford scanner uses a yellow/green source which vastly improves the light/dark contrast, thus eliminating the effect where any red-based colours are faded down to white and so do not show up in the scanned image.
All these features and facilities combine to make the Archi Page Scanner the fast and convenient way in which to add that extra impact, interest and clarity to documents, reports, instruction sheets, manuals, news letters, etc., from your Archimedes DTP package.

Introductory Prices:

Archi A4 Scanner	£349
Sheet Feeder for above	£95
Scanner + Sheet Feeder	£419

Z88 Portable Micro



£189

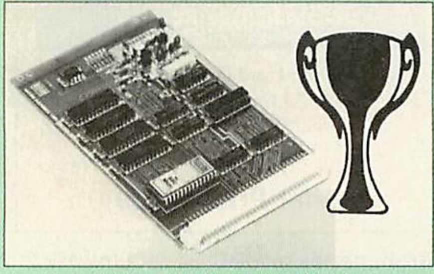
FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

Z88 ACCESSORIES

• 32K RAM Pack or 32K EPROM Pack	£18.00
• 128K RAM Pack or 128K EPROM Pack	£42
• 512K RAM Pack	£175
• Z88 Eprom Eraser Unit	£33
• Z88 Spellmaster for Pipedream	£51
• Z88 Carrying Case	£8
• Z88 Computing Book	£9.95
• AA Nicad Rechargeable Battery	£1.50
• Battery Charger Compact & Fast	£6
• Z88 Serial Printer Cable	£8
• Z88 Parallel Printer Cable	£25
• Z88 to Archi Link	£15
• Z88 to BBC Link £20	• Z BASE £56
• Z88 to PC Link II £30	• Z TAPE £42
• Z88 to Macintosh £52	• Z TERM £42
• Z88 Mains Adaptor £9	• Z88 Modem £149

Archi Real-Time Digitiser



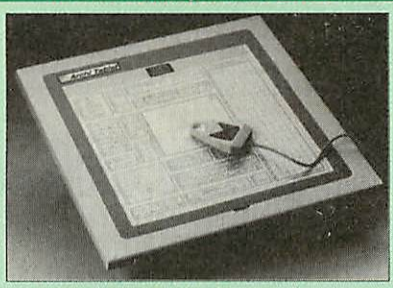
Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £175

A Set of Colour Filters for colour image grabbing using a video camera	£16
New Risc-OS Software Upgrade	£39

Archi Graphic Tablet

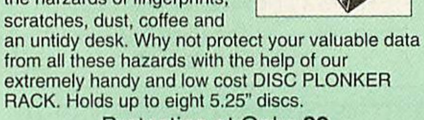


The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic for use in Education).
(FREE this month, PC Mouse Drivers & Art package)

Special Price £199

(Price includes Tablet, Leads, Software & Puck)
Stylus Optional Extra **£15**
Archi Graphic Tablet Junior. Working area 9" x 6". Price includes Stylus **£125**

Disc Plonker Rack



When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: **£2**

Acorn & Watford DFSs

• Watford sophisticated DFS ROM	£16.00
• Watford DFS Kit complete	£69.00
• We will exchange your existing ROM for Watford's ultimate DFS ROM at only	£12.00
• DFS Manual (comprehensive)	£6.95
• Acorn DNFS ROM	£17.00
• Acorn ADFS ROM only	£25.00
• Acorn 1772 DFS ROM Kit	£49.00

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.
Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

• SPECIAL PRICE	£44.00
• DDFS Manual (No VAT)	£6.95
• We will exchange your existing DFS Kit for our sophisticated DDFS for only	£30.00

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

3M – Diskettes

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

• *10 x 5.25" S/S D/D 40T (744)*	*£5*
• *10 x 5.25" D/S D/D 40T (745)*	*£5*
• *10 x 5.25" S/S D/D 80 Track (746)*	*£7*
• *10 x 5.25" D/S D/D 80 Track (747)*	*£7*
• *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT*	*£11*
• *10 x 3.5" S/S D/D 40/80 Track*	*£7*
• *10 x 3.5" D/S D/D 40/80 Track*	*£8*
• *10 x 3.5" Double Sided High Density*	*£15*

Top Quality 3.5" & 5.25" Diskettes

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

• *10 x **M3** 3.5" D/S D/D 80 Track*	*£7*
• *10 x **M9** 3.5" D/S High Density*	*£12*
• *10 x **M4** 5.25" S/S D/D 40 Track*	*£5*
• *10 x **M5** 5.25" D/S D/D 40 Track*	*£5*
• *10 x **M7** 5.25" D/S D/D 80 Track*	*£7*
• *10 x **M8** 5.25" D/S H/D Hi-Density*	*£12*
• ***M2** 3" Double Sided*	*£2.50 each*

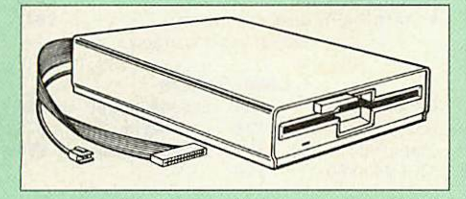


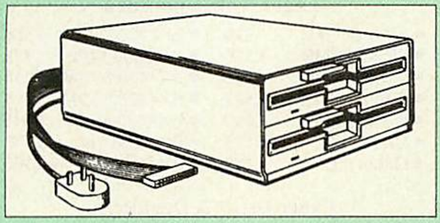
CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Quality Disc Drives from Watford

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. All 5.25" Disc Drives are 40/80 track switchable. For ease of use, the switches are front mounted. Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, are the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. ***Ideal for Schools & Colleges.***
When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. *(Turn to the 6th page of our advert for the Plinths).*
P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is our special Compact Disc Drive cables designed by us.

"Test Bureau Approved for Use in Education"



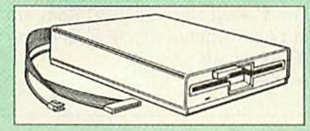


Our Disc Drives conform to BS415

Type	Description	
	Disc Drive without PSU	
• **CLS400S:**	Single, 40/80 track 400K Double sided Drive	**£72**
• **CLD800S:**	Twin, 40/80 track, 800K Double sided Drives	**£142**
	Disc Drive with PSU	
• **CS400S:**	Single, 40/80 track, 400K Double sided Drive	**£82**
• **CD800S:**	Twin, 40/80 track, 800K Double sided Drives	**£155**

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Disc Drive/DDFS Offer



- The popular CLS400S 40/80 track switchable disc drive.
- Watford's popular Mk II DDFS Interface (allows up to 720K storage). Will run both in single & double density modes.
- A comprehensive DFS Operating manual

Bargain at Only **£119** (Offer valid until stocks last)

3.5" DISC DRIVE

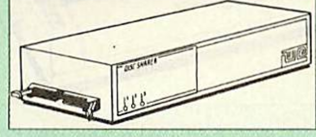


These top quality 3.5" Double sided, 80 track, are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Type	Description	
	Disc Drive without PSU	
• **CLS35:**	Single Disc Drive, 400K	**£62**
• **CLD400S:**	Twin Disc Drives, 800K	**£109**
	Disc Drive with PSU	
• **CS35:**	Single Disc Drive, 400K	**£83**
• **CD35:**	Twin Disc Drives, 800K	**£126**

(P.S. CS35 is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage)

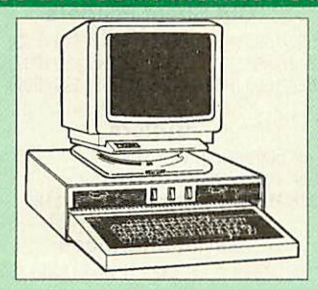
Disc Drive Sharer



(Ideal for educational establishments)
A low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Price includes 3 Cables **£55**

Disc Drives in Monitor Stand



• **CDPM 800S** – Twin 5.25", 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC B & Master 128K micros. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

£165

• **DP35 800** – Same as above except, one disc drive is a 5.25" and the other is 3.5".

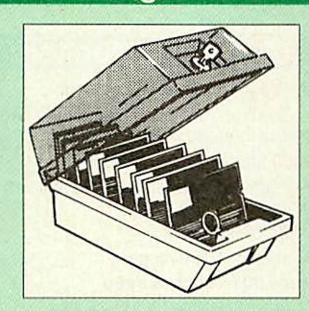
£154

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

Antistatic Lockable Disc Storage Units

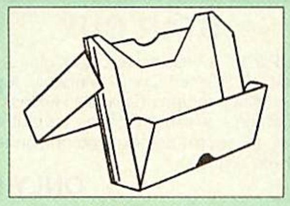


Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

- **M35** – holds up to 50 5.25" discs **£4.95**
- **M85** – holds up to 95 5.25" discs **£6.95**
- **M25*** – holds up to 25 3.5" discs **£4.95**
- **M50** – holds 50 3.5" discs **£6.50**
- **M10** – holds 8 of No. 10 Data Cartridges **£15**

* Not lockable

Plastic Library Cases



Holds up to 10 x 3.5" Discs.	**£1.50**
Holds up to 10 x 5.25" Discs.	**£2.00**

Dust Covers (For our Disc Drives)

Single CLS (without PSU)	**£3.20**
Single CS (with PSU)	**£3.25**
Twin CLD (without PSU)	**£3.85**
Twin CD (with PSU)	**£3.90**

Disc Albums

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special Bulk Offer on Discs

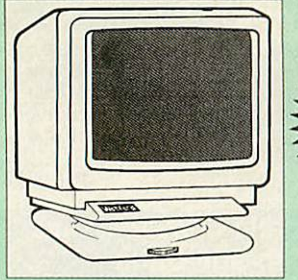
(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)



BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
• Without Sleeves 5.25"	£30	£35	£40
• With Sleeves 5.25"	£33	£38	£43
• 3.5" D/S D/D		£29 for 50	£52 for 100

Continued→ → → → → → → → → →





Microvitec Monitors

- **1431** – Standard Resolution Monitor £172
- **1451** – Medium resolution, suitable for word processing in mode 0 £215
- **Cub3000** Medium Res for A3000 £195
- **1441** – High res, exceeds the capabilities of the BBC Micro £359
- **2040 CS** 20" Hi Res £675
- Dust Cover for Microvitecs £5.50
- **Touchtec 501 Touch Screen** £239

Multiscan Colour

• Eizo 9060S	£389	• NEC 4D	£685
• Eizo 9070S	£579	• Taxan 770LR	£383
• Panasonic	£325	• Taxan 775	£383
• NEC 2A	£289	• Taxan 795-PC	£430
• NEC 3D	£358	• Taxan 875	£565
• VIDC Enhancer Board			£25

(P.S. Taxan 795 monitor is supplied with a FREE VIDC enhancer board)

Philips

- **BM7502** 12" Hi-res Green Monitor £70
- **CM8833** 14" Med. Res Colour Monitor £173

STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor . A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £159

Dust Cover for Philips Monitors £6
(Securicor carriage on Monitors £7)

Spare Monitor Leads

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

£12

Canon Bubblejet Printers

Type	Printer	CS Feed	Ink Cart
BJ10E	£222	£54	£18
BJ300	£375	£88	£12
BJ330	£445	£110	£12

NEC Pinwriter Printers

• P30	£257	• P60	£379
• P70	£485	• P90	£655

Be Satisfied Before You Buy

We have on display, various Micros, Printers, Disc Drives, Monitors, etc. Call in at our showroom to evaluate before you buy.

Concept Keyboards

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117
Archi A3 Keyboard	£144
Archi A4 Keyboard	£118

FREE On-Site Maintenance

This month we are also offering at no extra cost to all our customers, 12 months, On-Site Maintenance on all Microvitec and Multiscan colour monitors, all Panasonic printers, and all Laser Printers, Roland Plotters and of course the full range of Archimedes micros. Should the machine fail, simply telephone the maintenance engineer, who will call in within 12 working hours. (Offer applicable only when bought at prices advertised in this advert. UK mainland only).

Hewlett-Packard Printers

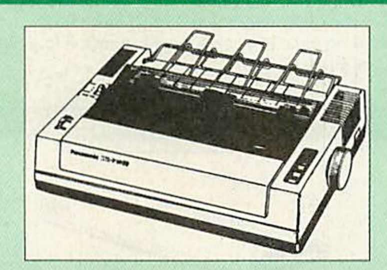
• Desk Jet 500	£368	• Paintjet XL	£1155
• Desk Writer (Mac)	£482	• Quiet Jet Plus	£376
• Desk Jet Cartridge	£15	• HP Think Jet	£240
• Paint Jet Colour	£625	• Rugged Writer	£849

- Paintjet Cartridges Black **£19;** Colour **£25**
- Desk Jet 500 256K RAM cartridge £129
- HP Epson FX Emulation Cartridge for Desk Jet £59

HP Apple Talk Interfaces for

- Scan Jet £299 • Paint Jet £POA
- Desk Jet Unlimited (Book No VAT) £19.75

Panasonic Printers



FREE with every **KX-P1081 & KX-P1180** Printers: A printer lead (please specify type required) and a Dump Out 3 ROM for the BBC Micro or 1,000 sheets of paper for other micros (please specify)

- **KX-P1081** 9pin 80col. 144/28 cps £122
- **KX-P1180** 9pin 80col. 192/38 cps £129
- **KX-P1123** 24pin 80col. 192/63 CPS £165
- **KX-P1124i** 24pin 80col. 192/63 CPS £224
- **KX-P1624** 24pin 132col. 192/63 CPS £299
- **KX-P1695** 9pin 132col. 330/86 CPS £299
- **KX-P1654** 24pin 132col. £439

Above prices include FREE, Watford's 12 months on-site maintenance

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	£175	KX-P1540 (P35)	£175
KX-1124 (P36)	£85	KX-P1180 (P37)	£79
KX-P1624/1695 (P38)	£124	KX-P1123 (P37)	£79

Buffers

P12 4K buffer Board for 1081	£55
P42 32K buffer Chip for 1592/1595	£16
P43 32K Buffer Chip for 1540/1124/1180	£16

Serial Interfaces

P17 P1081/1592 £32 **P19** P1124/1180 £55

Citizen Printers

120D Plus	£99	124D Printer	£165
Prodot 9	£239	Prodot 24	£339
Swift 9	£149	Swift 24#	£216

- Prodot Cut Sheet Feeder £120
- Swift 24 Colour Option £32
- Swift 24 Ribbons Black £4 Colour £13

Special Offer this month – A FREE Colour option cartridge with every Swift 24 printer purchased from us.

Star Printers

- **LC10** 9pin 80col. 144/36 CPS £117
- **LC15** 9pin 136col. 180/45 CPS £195
- **LC24-10** 24pin 80col. 180/60 CPS £163
- **LC24-15** 24pin 136col. 200/67 CPS £305
- ***FR10** 9pin 300/76 CPS 31K 16 fonts £259
- **FR15** Wide carriage version of above £319
- ***XB24-10** 24pin 80col. 240/80 CPS £319
- **XB24-15** 24pin 80col. 240/80 CPS £389
- **XB-24** Colour Kit £35
- **LC-200** Colour 9pin 80col. 180/45 CPS £160
- **LC-24-200** 24pin 80col. 222/67 CPS £195
- **LC24-200** Colour 24pin 80col. 222/67 CPS £230

*FREE Colour Ribbon with these printers

Star Accessories

Cut Sheet Feeder

LC10/200/24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139

Serial Interfaces

SPC-10 LC10; LC10-II; LC10-Col; LC15; LC24-10; LC24-15; LC-200; LC24-200 £49
8K Ser LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15 £64

Paper Roll Holders

LC-200; LC24-200; LC24-200 colour £29

Buffers

32K Ram Card for LC24-10; 15 & 200	£55
32K Ram Card for XB24-10 & 15	£55

Ribbons

LC10; LC10-II; LC15	Black £4;	Colour £6
LC-200; LC24-200	Black £5;	Colour £12
XB24-10; XB24-15	Black £5;	Colour £12

Laser Printers

• Canon LBP-4	4ppm	£690
• Canon LBP-8 IIIR	8ppm	£1535
• Canon LBP-8 IIIT	8ppm	£1410
• Epson EPL7100	6ppm	£720
• HP Laserjet III	8ppm	£1035
• HP Laserjet IIID	8ppm	£1539
• Panasonic KX-P4420	8ppm*	£659
• Panasonic KX-P4450i*	11ppm*	£1075
• Panasonic KX-4455 Postscript	11ppm*	£1699
• Qume Crystal Print Publisher 2		£1899
• Star LP-8 III		£985
• Star LP-8 Star(post)script		£1215
• Star LP-4 4ppm		£735
• Star LP-4PS Postscript 4ppm		£927

* Now 2 years warranty

Laser Toners

Canon 2 & 4	£54	Laserjet II & IIP	£55
Epson GQ	£18	Laserjet III	£75
Star LP-8	£69	Qume Crystal	£56
KX-P4420/50	£22		

Laser RAM Upgrades

• IIP & III 1MB	£79	• EPL7000 2M	£365
• IIP & III 2MB	£125	• GQ5000 512K	£95
• II & IID 1MB	£80	• KX4420/50 1M	£158
• II & IID 2MB	£127	• KX4420/50 2M	£220
• II & IID 4MB	£299	• KX4420/50 4M	£349
• Canon LBP4 1M	£175	• Star LP8 1M	£143
• Canon LBP8 2M	£150	• Star LP8 2M	£285

Laser Drum & Developer

• Epson Drum GQ5000	£93	EPL7100	£129
• Panasonic 4420 Drum	£60	Developer	£59
• Panasonic 4450 Drum	£93	Developer	£80
• Qume Drum	£76	Developer	£56

Jetpage Postscript Cartridge

- HP IIP/III £255 IID & IIID £265

NEW – HP Laserjet

Various Font Cartridges	£45
Superset Font	£195

Integrex Colour Jet

- Colour Jet 132 Printer £515
- Paper Roll £6.50
- BBC Screen Dump Software £10
- Colour Cartridge £19.50
- Black Cartridge £11.25
- Black Textile Cartridge £17
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123

Special Offers this month

Canon BJ 10E Printer	£219
HP Deskjet 500 Printer	£349
Panasonic KX-P1123 Printer	£162
Panasonic KX-P1124 Printer	£180
Panasonic KX-P1592	£199
TAXAN 795 Trinitron	£435

Epson Printers

DFX5000	£1105	LQ860 Colour	£489
DFX8000	£2070	LQ1050+	£520
EX1000	£535	LQ1060	£606
FX850	£294	LQ2550+	£729
FX1050	£368	LX400	£116
FX1060	£599	LX850	£179
LQ400	£178	SQ850	£459
LQ550	£246	SQ2550	£719
LQ850+	£425		

Cut Sheet Feeders for

LX400/800/850/LQ400/500/550	£69
EX800/FX800/850/LQ800/850	£130
FX/LQ 1000/1050/SQ850	£159
LQ 2550 £390 SQ2550	£390

Tractor Feed for

LQ800 **£44;** LQ850/FX850 **£69;** LQ1050/FX1050 **£85;** LQ2500 **£90;** LQ2550 **£90.**

Accessories

- EX800/1000 Colour Option **£45**
- EX800/1000 Colour Ribbon **£14**
- LQ2500 Colour Option **£65**
- Multifont Card for LQ550/850/1050 **£95**

Epson Printer Interfaces

All these interfaces fit inside the printer

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£95	RS232 + 8K Buffer	£75

Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 6'	£6
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£6
IBM/Archimedes Parallel Lead 5 metres	£13
IBM/Archimedes Parallel Lead 10 metres	£19
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.
IBM Keyboard extension lead coiled	£5

Plotters

HP Plotters

- HP7440 £425 • HP7475 £615

Roland Plotters

- DXY1100 £515 • DXY1200 £655
- DXY1300 £865 • DXY2500 £2375
- DPX3500 £3385 • Sketchmate £380
- Roland plotter Pens, Fibre tip £7.50

Roland SketchMate

The Intelligent Graphic Plotter

The SketchMate offers the same high performance and versatile function of larger, more expensive plotting systems, but at an affordable price. It is very compact and lightweight. In restricted space, it can be operated in a tilted position. Is compatible with virtually all CAD software as well as a wide range of business softwares. The 'ArtMate' software package supplied, is designed to be used with IBM PC/AT systems.

Specifications: Plotting area: 297 x 216mm. Number of Pens – 8. Magnetic Paper holder. 5K Buffer. Parallel and RS 232 Serial interfaces. Accessories: 8 pens, AC Adaptor, 4 x Magnetic paper holders, User manual, marking sticker, Rubber sticker, 10 x A4 test paper, 2 x A4 OHP transparency film. Dimensions: 360(W) x 410(D) x 105(H)mm. Weight 2.6 Kgs.

Launch Offer: £380



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Listing Paper (Perforated)

• 1,000 Sheets 9.5" x 11" Fanfold Paper	£7
• 2,000 Sheets 9.5" x 11" Fanfold Paper	£11
• 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold	£21
• 1,000 Sheets 15" x 11" Fanfold Paper	£9
• 2,000 Sheets 15" x 11" Fanfold Paper	£16
• 1,000 Sheets true A4 Fanfold Paper 70gms	£11
• 2,000 Sheets true A4 Fanfold Paper 70gms	£21
• Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£6.00
1,000 90 x 36mm (Twin Row)	£6.25
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.75

Special Offer

Hitachi/Acorn 12" High Resolution, ergonomically designed Colour Monitors. Supplied complete with a swivel base and a BBC lead.

Only: £139 (While stocks last)

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	£6.00	–
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£2.75	£4.50
DMP2000	£2.75	£4.75
EX800/1000	£3.50	£5.00
RX/FX80/85/800/MX80	£2.95	–
FX/MX/RX100/1000	£3.95	–
Kaga/Taxan KP810/815	£3.25	£5.00
LQ400/500/550/800/850	£3.25	£6.00
LQ1050/LQ2500	£4.00	–
LX80/86/800/850	£2.75	£4.50
LX400	£3.50	£5.00
M1009/GLP	£2.95	£3.75
NEC P2200	£4.50	£5.00
Panasonic KX1080/81	£3.25	£4.75
Panasonic KX-P1124	£7.50	£5.00
SQ2500	£23.00	£5.50
Star LC10/NL10	£2.75	£5.00
Star LC24-10	£2.95	£6.00
Olivetti Ink Jet Cartridges (set of 4)	£9	

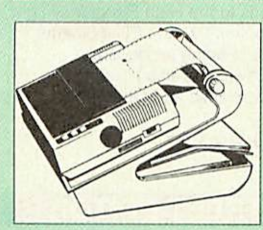
Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595	£7
P115 for KX-P1180/P1624	£7
P145 for KX-P1124	£8
P140 for KX-P1540	£10
Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red	£9.95 each

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer func-tions is effectively halved. Its ergon-omic design ensures smooth paper flow and automatic refolding.

80 Column version £24 (carr. £3)
132 Column version £29(carr. £4)

Universal Printer Sharers/Changer

Connect up to 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics
2 to 1	£16	£17
3 to 1	£22	£24
5 to 1	£36	£32

(Cables extra at £6 each. Please specify type required when ordering)

2 Way Compact Printer Switch

A handy 2 way printer switch. Enables one micro to be connected to 2 printers or vice versa.

Centronics **£18;** Serial **£17**

(Cables extra at £6 each)

Auto Printer Sharer Switch

Connects	Serial	Centronics
2 to 1	£36	£39
4 to 1	£59	£55
8 to 1	–	£85

256k Multi Spooler

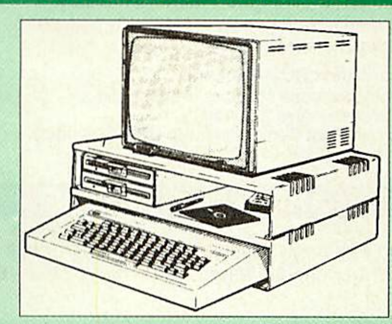
These Auto Centronics Printer Sharers have built-in 256K of Printer Buffers. They can be used as Auto Sharers, Printer Buffers or both.

- 2 In/2 out **£135** • 4 In/2 out **£169**
- 8 In/1 out **£199**

Compact Converter Units

Serial to Parallel **£36** Parallel to Serial **£37**

Plinths for the BBC B & Master 128K Micros

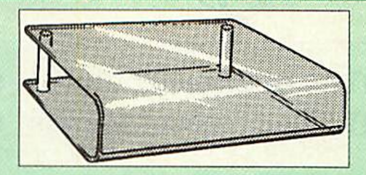


Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid. Colour: Matching BBC Beige.

Single BBC Plinth	420 x 310 x 105mm	**£13**
Double BBC Plinth	420 x 310 x 210mm	**£24**
Single Master Plinth	490 x 310 x 105mm	**£14**
Double Master Plinth	490 x 310 x 210mm	**£26**

(Carr. Single plinth £2; double plinth £3)

Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version	**£16** (carr £3)
136 Column version	**£20** (carr £4)

Continued→ → → → → → → → →



- Quest Mouse II & Quest Paint — £58
- Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont — £89
- Quest Mouse II only — £29
- Quest Paint Software only — £34
- Quest Font Disc (22 Text Fonts) — £15
- Quest Mouse Mat (Red or Blue or Green please specify) — £3
- Quest Colour Dump Disc – This new software allows you to print direct from Quest Paint to your Integrex Colour Printer — £18

(P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software



Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

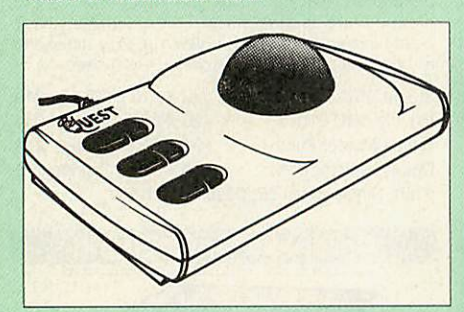
ConQuest ROM Package — £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro — £32

QUEST – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version — **£27**
QT-20 Archimedes Version — **£30**

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£46

THE NEW Mk III AMX MOUSE

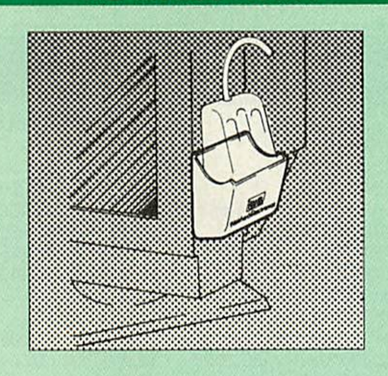
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

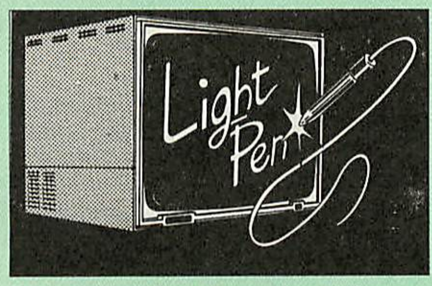
MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

WE Mouse House



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk.
It protects it from damage when not in use, yet within easy reach when you need it again. At £4 it does not cost a rodent's ransom.

Price £4



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro. This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket. The software supplied includes a sophisticated, fast screen dump routine.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

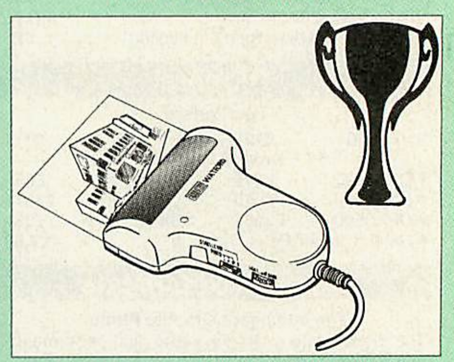
£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

The Beeb HandScan

Hand-held Scanner for the BBC Micro

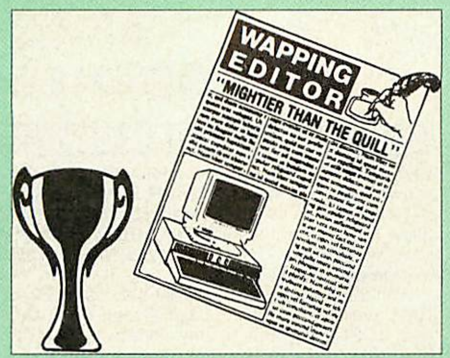


Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware — **£135**



Winner of the BBC Acorn User 1990 Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

Page Layout Section

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module incorporates the facilities like: pencil, brush, airbrush, polygon, circle, eclipse, fill, cut & paste, etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

Word-Processor

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

The Font Editor

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.
Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser.

Wapping Editor Software Pack £69
Wapping Editor plus Mouse £89

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)



At the request of many of our customers we are now able to offer training in the use of Wapping Editor DTP package. For further information please telephone 0923 37774 and ask for Tim or Shiraz

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

Wapping Font Disc 1

Sixteen additional fonts, including smaller version of Oberon and Daisy and two new sizes of the standard font for the Wapping editor.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

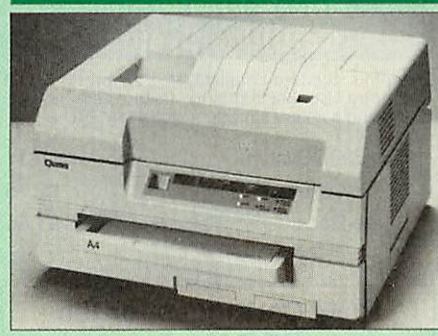
£12

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts for the Wapping Editor DTP pack. (80 track discs only).

£13

Laser Direct



By using the power of the Archimedes RISC processor, it offers the best of both worlds – print speed up to 5 times faster than typical Laserjet compatibles – uses outline fonts so that any font can be scaled to any size – works with all programs that use RISC OS printer drivers. Ideal for use with Genesis, !Draw, Acorn DTP, Impression, etc. Includes 50 sheet paper tray and a single sheet/envelope tray. Requires one expansion slot and at least a 2Mbyte Archimedes. A very compact printer, a very low initial cost and very low running costs.

Special Price: £849

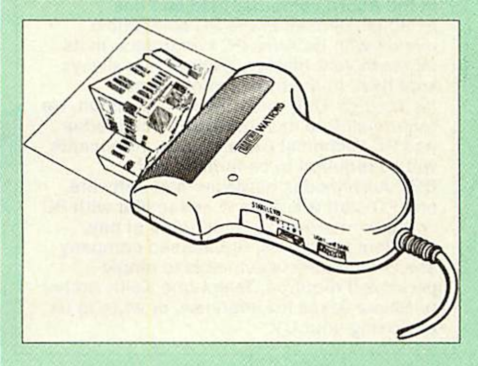
- Special High Res Laser Direct Card 600 DPI for Canon LPB4 Laser Printer **£325**
- LPB4 Printer plus High Res Card **£1025**

(For demonstration, call in at our retail shop)

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

All prices are exclusive of VAT

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system, for only £149. The package includes the most comprehensive utility software available for the Archimedes, a high quality hand held scanner, and all necessary documentation to get you going straight away.

SCANNER

The scanner is capable of scanning up to an amazing 400 dots per inch (DPI)! The scanning area is 4" wide, and the height is only limited by the maximum amount of memory available. The dot resolution may be switched to 100, 200, 300 or the maximum 400 dpi. One of four operating modes may be selected offering either pure monochrome scanning, or one of three grey level modes. The grey level modes use different size dither patterns to represent up to 16 shades of grey. There is also a dial to allow the "brightness" to be adjusted over a wide range, in order to optimise the quality for any specific image. The scanner interface is a standard, single width, expansion card (podule) which plugs into the Archimedes' backplane. The socket on the rear panel connects the scanner by 1.8 metres of cable.

SCANNER SOFTWARE

Full use is made of the windowing and the multi-tasking facilities of RiscOS. The software is supplied in a 64Kbyte ROM located on the interface board. The scanner appears as a small icon on the desktop icon bar, and the software is retrieved from the ROM simply by clicking on that icon. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. The other facilities included in the software are.

Cropping and scaling to any size including stretching and squashing in X and Y direction separately.

Colour tinting.
X and Y flip.

Edge detection which turns solid objects into outlines.

Selective directional copying which allows features (i.e. lines or text) to be made thicker or thinner.

Scanned images may be saved as sprite files or transferred directly into other RiscOS applications (DTP, Draw, Paint) simply by dragging the sprite file into the application's window. Sprites may also be generated using anti-aliasing. This greatly improves picture quality and is particularly effective when scanning material with a range of grey tones, such as photographs. Images can be printed on any printer that is supported by a RiscOS printer driver, with optional settings for portrait or landscape modes, image scale and positioning. Images are printed using the full resolution of the printer and are not limited to the screen resolution.

On-screen help is provided via the RiscOS interactive help facility. Calls are also provided in the ROM for users wishing to write their own software, incorporating the use of the scanner.

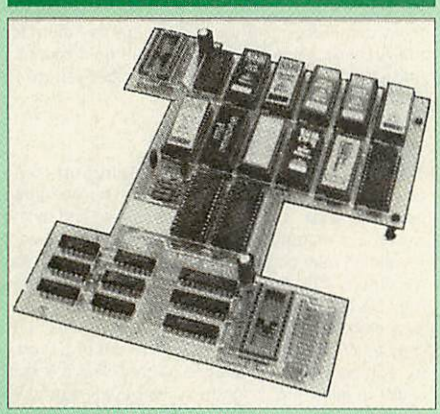
AHS-4 Archi 300/400 Version £149
AHS-3 Archi A3000 Version £175

Continued→ → → → → → → → →

STAFF VACANCIES

Watford Electronics is the leading supplier in the Acorn computer field and has established itself in the PC compatible market with its Aries PC computers. In its eighteen year history, Watford has always kept itself at the forefront of the new technology. Due to our latest expansion, we require staff to man our BBC/Archimedes and PC Technical Departments. Applicants will be required to be familiar with BBC/Archimedes hardware and software, and PC staff will need to be familiar with PC computer hardware. Good rates of pay, excellent prospects. Subsidised company accommodation is available to single persons if required. Telephone Keith Archer or Shiraz Jessa for interview, or write to us enclosing your CV.

Solderless Sideways ROM Socket Board



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

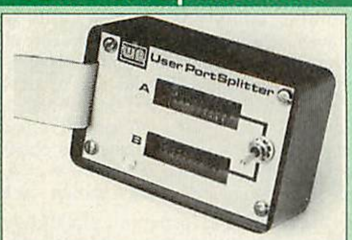
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

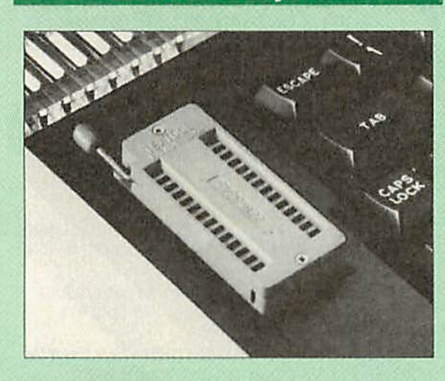
User Port Splitter Unit



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B and B+ compatible.

ONLY **£18** (carr £3)

BBC B Low Profile Cartridge System

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

- Complete System **£11**
- Spare Cartridges **£2.75**
- Spare Rack **£1.65**

ROM Cartridges for the BBC Master

Will accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£9**; Quad **£14**

16K Disc Ram Module

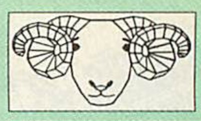
(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for profressional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional Battery back-up fitted **£3**



ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£69** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:		
	Aries B-12	**£36**
	Aries B-12C	**£5**

Aries B-488 IEEE-488 Interface Unit

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

Voltmace Joysticks

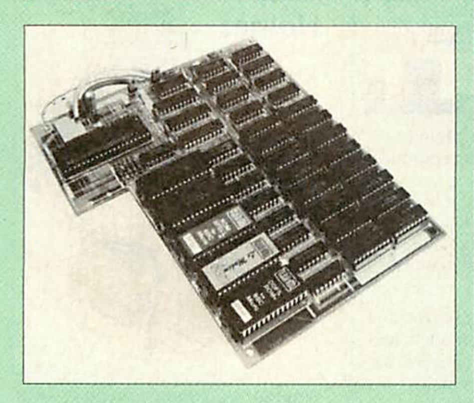
Delta 3B Single Joystick	**£10**
Delta 3B Twin Joysticks	**£15**
Delta 3C Joystick for Compact	**£10**
Delta 14B Single Joystick	**£11**
Delta 14B/1 Adaptor Module	**£12**
Transfer Software Disc-Tape	**£7**
Delta-Cat A mouse eliminator Joystick for the Archimedes	**£24**

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 **£25**

ROM/RAM Card



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

PRICES:

- **ROM/RAM card with 32k dynamic RAM £48**
- **ROM/RAM card with 64k dynamic RAM £65**
- **ROM/RAM card with a massive 128k dynamic RAM £109**

(carriage on ROM-RAM Card £3)

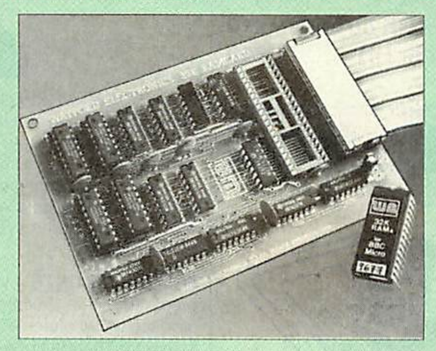
OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit £9
- 16k Dynamic RAM for Upgrade £13
- Battery backup £3
- Read and Write protect switches £2 each

Complete ROM-RAM board
All options installed £115

P.S.
IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K Shadow RAM/Printer Buffer Card Expansion Board



A MUST FOR WORD PROCESSING

Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.
- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)

(Price includes a comprehensive manual and the ROM)

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs **£20.00**
- Maths with a Story 2 (Disc). 4 further maths programs. **£20.00**
- Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs. **£17.00**
- ECOLOGY O-Level program. **£20.00**
- POLYMERS O-Level program. **£20.00**
- Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. **£20.00**
- ADVANCED TELETEXT SYSTEM **£8.65**
- PERIOD TABLE SOFTWARE **£20.00**
- Computers at Work – Primary **£17.35**
- Introducing Geography 11-17 years **£17.50**
- Electric Fields 6-14 years **£11.25**
- Espana Viva – 3 Discs **£19.95**
- WHITE KNIGHT Chess game **£16.00**
- A Vous La France **£29.00**

More Educational Software

- **FUN SCHOOL 2 – Red:** Under 6 yrs – 8 programs on Discs, Shape Snap, Find the Mole, Teddy Count, Write a Letter, Colour Train, Pick a Letter, Spell a Word & Teddy Bears Picnic. **£12.00**
- **FUN SCHOOL 2 – Green:** 6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump **£12.25**
- **FUN SCHOOL 2 – Blue:** Over 8 yrs – Eight programs on Disc, Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape. **£12.50**
- **FUN SCHOOL 3 – Red £19.95**
- **FUN SCHOOL 3 – Green £19.95**
- **FUN SCHOOL 3 – Blue £19.95**
- Six French Games – Aimed at pupils in their first year of French, but also useful as revision for more advanced students 11 years+ **£26**
- More French Games – Another 6 games 12 years+ **£26**
- Au Restaurant and Accident de Route 12 years+ **£26**
- Boulogne and Oh-Les – 2 programs for beginners **£26**
- Letters to French Penpals – 11 years+ **£26**
- French Programs with Henri Beret – The programs in this series present vocabulary, grammar and role-play phrases in the form of animated games. 11-16 **£22**
- Six German Games – Aimed at pupils in their first year, but useful as revision for more advanced student of German. 12 years+ **£22**
- More German Games – Aimed at pupils in their 2nd year of learning German. 12 years+ **£22**
- The Cloze Program – Using context clues to predict is much more than a gap filling exercise. All ages **£26**
- An Introduction to Electronics – Brings together all the basic electronics required for a GCSE Physics or CDT course. 14-16 years **£26**
- Computer Control – This is a package of 3 programs simulating control of a greenhouse, a robotic arm & a chemical plant. 14-16 years **£26**
- The Nuclear Reactor – An interactive, menu driven program for GCSE pupils. Demonstrates & explains nuclear fission & the chain reaction. 14-16 years **£22**
- PUNCMAN Learning punctuation
  - Puncman 1 & 2 for 7 – 13 years **£15**
  - Puncman 3 & 4 for 8 – 14 years **£15**
  - Puncman 5 & 6 for 8 – 15 years **£15**
- Yes Chancellor – A chance to take over number 11 at Downing Street. 12 years+ **£18**
- Letters & Pictures – Introduces phonic skills to Infants 6-8 years **£15**
- Numbers & Pictures – Early number learning is a great fun (4-6 years) **£15**
- Note Invaders – Budding musicians can learn the notes on the Clef with this elegant game 3 programs (7 to Adults) **£15**
- Maps & landscapes No. 1 (9-14 years) **£18**
- Help Your Child learn Basic Map work No. 2 (9-14 years) **£18**
- Pirate – Educational Adventure (8-14 years) **£15**
- Spelling Week by Week (6-14 years) **£18**

Archimedes Software

- Bookbinder **£43**
- BUMPER DISC **£14**
- Bumper Disc 2 **£14**
- Craftshop 1 **£26**
- Craftshop 2 **£26**
- Desktop Stories **£27**
- DigiSim **£35**
- Droom **£17**
- Jiglet **£27**
- Jigsaw **£28**
- Numerator **£60**
- Snippet **£26**
- Fun School 2A Red (up to 6 years) **£12**
- Fun School 2A Green (6-8 years) **£14**
- Fun School 2A Blue (8 years +) **£14**
- Gate Array Teaching System **£68**

Continued→ → → → → → → → → →

Computer Concept's ROMS

Communicator	£49
Disc Doctor	£28
Inter BASE	£49
Inter CHART	£25
Inter SHEET	£37
Inter WORD	£36
Mega-3 ROM	£76
Spell Master	£42
TERMI	£25
Wordwise	£24

Wordwise plus

£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

Acorn ROMS

View 3.0 ROM	£45
View Professional	£50
Viewsheet (Acornsoft)	£36
Viewstore	£36
Viewspell with 80 track disc	£25
Viewplot Disc	£20
(Please specify for Master 128 or Compact)	
View-Index	£12
Overview packs 1 & 2	£65
Hi-View	£38

MINI OFFICE II

DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.00
DISC Version for the Compact	£18.00

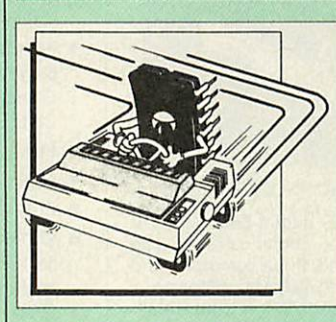
(When ordering please specify for which Micro & 40 or 80 track Disc)

All prices are exclusive of VAT

View Printer Driver Discs

Epson FX & RX 80	£10
Juki & Brother HR	£10

View Printer Driver ROM



View is a powerful word processor, but it seriously lacks in terms of printer driver support. With the View Printer Driver ROM, the View users will find themselves in the realms of advanced word processing.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

Price: Only £33

OFFICE MASTER



CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features

BEEBPLOT – Provides visual representation from Spreadsheet data.

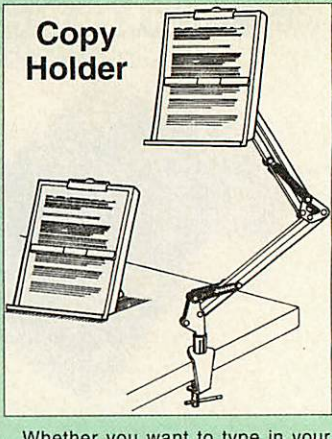
OFFICE MATE
Only £10 (Disc)

Acorn Speech Synthesizer package complete, for the BBC B Microcomputer

Special Offer £14



Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)
Angle poise **£12** (carr. £3)

The Epson RX/FX/KAGA Printer Commands Revealed Handbook

Printer Commands Revealed

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

ALL PRICES EXCLUDE VAT

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£6.95
15 Hr Wordprocessing BBC/WW & WW+	£6.95
30 Hour BASIC (BBC Micro)	£12.95
1st Word Plus Rel. 2 Manual	£10.00
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'ACORN TO PC' enables you to change over painlessly. It shows clearly and quicly how, why and where the two systems (Acorn and MS-DOS) differ. As with a foreign language dictionary, you can use the book to transfer either way – from Acorn to MS-DOS, or from MS-DOS to Acorn.

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'ACORN TO PC' is written clearly and concisely by Dr. John Lockley, who has wide experience of writing and broadcasting. He is currently appearing as a regular contributor on Radio 5, and is co-author of 'The Complete BBC Computer User Handbook'.

Price: £15.95 (No VAT)

The Complete BBC Computer User Handbook

If you own a BBC B, B+, Electron, Master 128 or Master Compact, or Archimedes, then this is the book for you. It shows how to get the best from your machine, and how to make it work for you. The general style and level of presentation means that both the expert and beginner alike will feel comfortable with the quality and quantity of the material.

Subjects covered include the general use of computers, hardware design and peripheral devices like printers, disc drives, etc, and Networking. Programming hints and tips and various disciplines for making a better program are discussed in some detail, including debugging of specific errors. Standard programs are covered, such as wordprocessors, spreadsheets, databases, graphics, communications, etc., which brings you neatly on to the subject of using computers in the office or at work – even giving advice on writing and marketing your own programs.

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The Complete Mouse User Guide to BBC Micro

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It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)

Example programs on Disc £4.95

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Beeb PC Basic is designed for program authors wishing to convert programs so that they will run on IBM personal computers. To convert BBC BASIC programs manually can waste days of valuable time with every occurrence of common statements such as PROC, DEFPROC, TAB, having to be changed.

Beeb PC (BASIC) automates many of these changes, and will convert majority of BBC statements that are invalid for IBM BASIC into equivalent acceptable statements. In addition BBC BASIC data files can be converted to IBM BASIC format, with support provided for all BBC data formats:- INTEGER, REAL & STRING.

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Beeb DOS 3.0

(Now reads Archimedes Discs)

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual. (Will only work on 360K Disk Drives & read only ADFS and Watford DDFS – not DFS).

Price: £39

(Please write in for technical literature)

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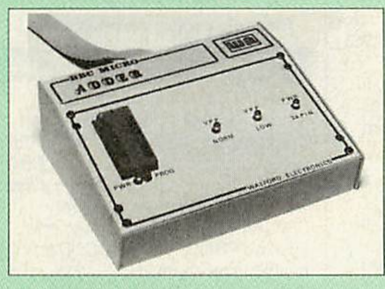
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The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
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The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.

Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
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£65 (£5 Carr)

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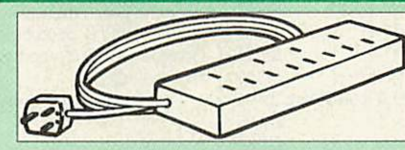
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Features:

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- 8/16 MHz selectable speed
- Legal Bios with built-in Setup routine
- OS/2 and XENIX compatible

Specifications:

- 1MB RAM on-Board expandable to 16Meg
- 1 x 5.25" – 1.2Meg Drive fitted
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- Case with Keylock
- Eight expansion slots
- Two Serial and One Parallel Ports
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Aries Notebook PCs are equipped with a full complement of 6 built-in ports; 2 x RS232 Serial; 1 x Printer; 1 x External floppy drive; an external Keyboard and a CGA colour monitor. The obvious benefits include the ability to connect directly to a printer, and to a full size desktop computer to transfer data or text, etc, or to a modem for communications.
Multiwriter 2 Word processor/spell checker, and PC Organiser diary software is supplied with all Notebook PCs to get you started, so now you can take computing power with you where you want to go, in the office, workshop or laboratory, on site, on the train, plane, or at home.

Aries Notebook I, II and III

These Aries Notebook PCs have energy-efficient 80C88 processor chips running at 10 MHz. Model I is supplied complete with a single 3.5" – 1.44MB floppy drive. The Notebook Model II and III are supplied with a 28mS fast access hard disc, 20MB and 60MB respectively.
In his independent review (Computer Shopper) the reviewer writes, 'The Aries Portable offers exceptional value for money . . . The computer itself is very much what you'd expect a notebook to be, small, with a cramped but very usable keyboard and a respectable backlit display. It is nice to see that you can actually use the extra 384K as EMS memory – there is even a utility that can turn the EMS into a RAM drive for you.'
In his final verdict he writes, 'Overall, the single most outstanding feature has to be the price tag. A notebook PC with hard disc for under £1,000 has no competition at the moment. If you have a small briefcase, weak arms, or just like the concept of a truly portable computer, then this is your man'.

Aries Notebook NB286-12

The New Aries NB286-12 has a faster, high efficiency 80286 processor running at 12MHz.

'. . . the strongest feature of the Aries is its Hard Disc, with a data transfer rate that would put most desktops to shame . . . the only notebook reviewed that incorporates a 16MHz processor (landmark speed). These two factors combine to make it the strongest performer . . .'

'In terms of value, the Watford comes up on top . . .'

'VERDICT: Excellent specification and performance. This has to be THE choice based on price and ability'.

Computer Shopper Jan. 1991

Specifications

• Processor:	80286 running at 10MHz (Notebook I, II & III); 80286 (Notebook NB286-12) running at 12MHz – Zero Wait State – Real Time Clock/Calendar
• Memory:	1MB RAM – 640KB + 384KB LIM/EMS
• Drive:	Internal: 3.5" Floppy Drive (Notebook I) – 2.5 " 20MB Hard Disc (Notebook II & Notebook NB286-12); Notebook III has an internal 2.5" 40MB Hard Drive all 28mS Access speed – Optional external 3.5" or 5.25" floppy drive
• Display:	Electro-luminescent (EL) backlit transflective supertwist LCD – 80 x 25 characters – 640 x 200 bit mapped IBM CGA compatible
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• Optional Extras:	External 3.5" Disc Drive – External 5.25" Disc Drive

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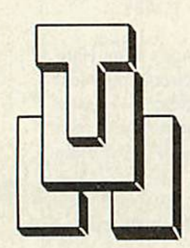
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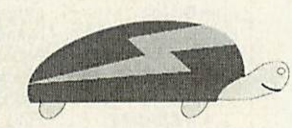


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Dart is a computer language. Using this language you can learn to control the computer so that it draws pictures for you. It will be possible to draw some very pleasing pictures. *Dart* is a subset of the LOGO programming language used in many schools.

The new version includes nine extra commands which, together with the existing commands, meet the National Curriculum requirements in Mathematics, Technology and English. The new commands include SETPOS to specify an absolute position and HEADING to specify the direction as a compass bearing.

Dart is available for the BBC B/Master and Archimedes/BBC A3000 computers and will control a Jessop floor turtle provided your computer has a User Port. The BBC B/Master version also supports the Valiant turtle and the BBC Buggy. A site licence costs only £25.

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EIGHT BITS

£10 FAST ELLIPSE DRAWING

Nusret Vardarman from Istanbul in Turkey is one of our many overseas readers, and says he is 'alone in his country with his Electron'. He has sent in a routine for drawing very fast ellipses in the BBC graphics modes – much faster than the operating system routines.

The routine is interfaced from Basic using the same technique as Nusrat's other article, by passing parameters through the extended CALL statement. There are five parameters passed to the machine code routine. These are:

S% – the start angle of the curve measured from +x axis in counter-clockwise direction.

A% – turn angle of the curve in counter clockwise direction R%.

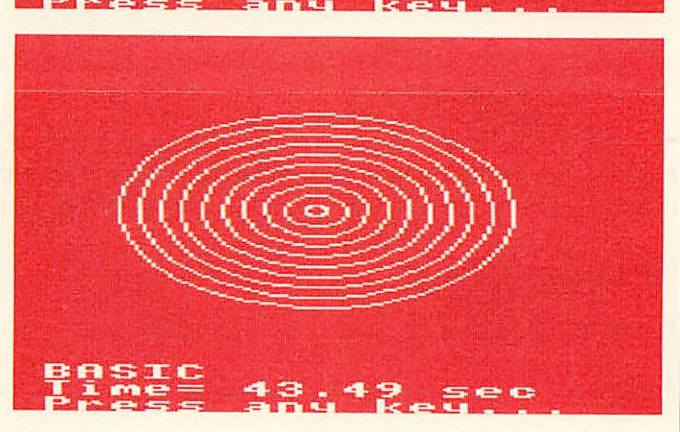
R% – radius of the curve.

X%,Y% – centre co-ordinates of the curve.

E% – if the curve is a circle, this value is equal to the radius. If the curve is an ellipse, R% is the size in the +/- x direction, and E% is the size in +/- y direction.

S% and A% values should be integers in the range 0 to 36. (A%=36 and E%=R% for a full circle.)

The curve is drawn by the high-speed plotting routines in 10 degree increments and a pre-defined sine table is used for the calculation of incremental points to draw the lines. This is the major time saving – the amount of time taken to calculate trigonometrical functions by BBC Basic is quite long, as it uses iterative polynomial calculations. By pre-calculating the sines, a lot of time is saved and the plotting can be completed much faster.



To use the routine in your own programs, type in the listing in the yellow pages, or load it from the monthly disc. Running the program causes assembly of the machine code and produces a file called Ellipse on disc. This file fits into page &9 and &A, and therefore doesn't corrupt the main memory.

Your own program should assign the parameters needed to draw the circle to the variables as described above, and then call the routine with CALL &900,S%,A%, R%,X%,Y%,E%. The example program supplied in the yellow pages uses the routine and also an equivalent BBC Basic routine to produce the same output. Note that the speed tests in this demonstration show Nusret's routine to be 15 times faster.

The routine can be incorporated into your own programs to remove the problem with the slowness of drawing curved lines – always a problem when trying to build up a quick screen display.

£10 BATCH PROCESSOR

Andrew Rowland of Barnsley felt that Matthew Lewis' utility to emulate the IBM's ability to pass parameters to EXEC files filled a long-felt want (*BAU* March 1991).

His neat solution to the problem prompted Andrew to add some other features of IBM batch files like ECHO, CLS and special characters. The new program can be found on the yellow pages, or on the monthly disc. Also on the monthly disc is an example batch file.

It is useful in EXEC files to be able to 'turn the screen off', preventing it from becoming cluttered with commands, which may be confusing to another user.

The usual way to do this is to include VDU 21, but this has two disadvantages: first, VDU 21 remains on the screen; second, if you have a BBC model B, there is a bug in the operating system (OS 1.20) which causes control codes, like carriage returns, to be sent to the printer, whether it is enabled or not. This causes your printer to suddenly leap into life and start spewing out paper!

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My answer is a pair of one-letter commands to be embedded in the EXEC file, like Matthew's parameters, each preceded by a percent sign – %O (for echo off, which switches off the screen), and %E (for echo on). In addition, %C for CLS clears the screen and %? deletes a character at all times.

Three more 'parameters' can be used. %M gives the Media Title – the disc title for DFS and NFS, and the directory title for ADFS. For Master 128 users only, the current time and date can be included using %D for the date and %T for the time in hours and minutes (if you want the seconds too, change line 2110 to LDX #24). Model B and Compact owners should omit lines 1498 and 1499.

Batch files are often used as quick menus, and this is particularly useful where other languages, like *View*, need to be started up. A menu program

```
Disc title: Redwood-1
  It is on edwood-1

 1. Word process with View
 2. Use account program
 3. Use diary
 4. Exit
Enter choice (1-4):
```

BATCH FILES ARE OFTEN USED AS SMALL MENUS

in Basic can only go so far! To do this on the Beeb would need a lot of print commands, each surrounded by %O and %E to prevent them appearing on the screen. So I include another two commands, %J for Jam, and %U for Unjam.

When the output is jammed, the EXEC file will be typed on the screen but not be executed, so there is no need for PRINT. A certain amount of care must be exercised in getting these the right side of carriage returns, and %? can be useful here to delete any '>' prompts which appear. Note that EXEC files can be terminated by *FX119 and you can't use INPUT, GET or GET$ in EXEC files unless they are in the last line, as the computer won't wait for you to press a key – it will take the next character from the file.

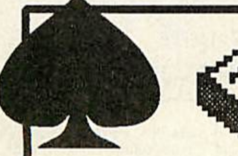
So when you need user input (as you will when constructing menus in this way), use INKEY with negative numbers to force a keyboard scan.

For example, if you want to detect the number keys 1 to 3, use:

```
REPEAT IF INKEY(-49) CHAIN
"Prog1" ELSE IF INKEY(-50) CHAIN
"Prog2" ELSE IF INKEY(-18) CHAIN
"Prog3" ELSE UNTIL FALSE
```

Negative INKEY numbers can be found in the user guide. An example file which demonstrates the new commands and implements a simple menu system is reproduced on the monthly disc.

The %O command works by diverting the OSWRCH vector, through which all characters to



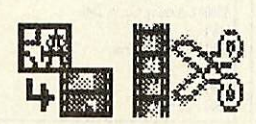


RISC OS Euclid is the best multi-tasking 3D graphics and animation system for the Archimedes. It is effectively a 3D version of Draw.

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Tween produces films from Draw files. It uses techniques similar to **Mogul** and generates a film by calculating intermediate frames from a set of key positions.

Splice allows you to edit films produced by **Mogul** or **Tween**. You can even produce hand-drawn cartoons by converting sprites from any source.

Such is the enthusiasm for **Euclid** there is a user group called **Elements**, now in its second year, which provides a quarterly disk containing hints, tips, animations and user pictures.

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be printed on the screen pass, to point to an RTS, so they never get as far as the VDU drivers. %E and errors reset this vector. %C and %? both work by sending the relevant VDU code to NVWRCH – non-vectored OSWRCH – so they are not affected by 'Echo off'.

%J and %U set or reset a flag that causes the bytes from the file to be printed via OSASCI. As the routine never reaches an RTS, the EXEC utility is kept waiting for the byte it requested!

The time, date and media title functions work in a similar way to Matthew's parameters. The relevant string is tacked onto the list of parameters stored in page &C00, using OSWORD with A=15 to read the Master's clock, and OSGBPB with A=5 to read the title. It then continues as if a parameter had been called.

The routine now needs an extra page of memory, occupying &900 to &C00. All-

```
This is normal text.
40 characters per line.
This is condensed text.
53 characters per line.

This is normal text.
40 characters per line.
This is condensed text.
53 characters per line.

>
```

CONDENSED TEXT IN GRAPHICS MODE

Commands may be in either upper or lower case, ie, %o is as good as %O.

£10 CONDENSED MODE 4

Nusret Vardarman, has also sent a very nice easy-to-use program which condenses text in graphics mode in a similar manner to the Computer Concepts *Inter* series.

Condense is a short machine code program, occupying only 189 bytes to display more characters on one line on graphics screens, ie, modes 0, 1, 2, 4 and 5. It does not define a new character set, so doesn't allocate any space for definitions. It can also be used for thin-style characters in standard width.

On calling the code, the string to be printed at the cursor position is transferred.

In the demonstration program, C$ contains the text to be printed, and this is transferred using the extended call statement, of the form CALL address, variable$, where Basic placed the address of the variables so transferred into a memory block starting at &600, making it easy for the machine code to pick it up.

This method makes the use of variables mandatory – you could not type CALL address,"constant". The code takes the character definition to zero page, and defines a new, thinner character. Then it prints the character, all printing being done at the graphics cursor, and moves the graphics cursor two pixels backwards. In this way, 53 characters can be printed on a 40-column screen (modes 1 and 4) and 106 on an 80-column screen (mode 0). For other modes, the Basic variable width should be changed as follows:

width=12 (for mode 0, 106 cpl)

width=24 (for modes 1 and 4, 53 cpl)

width=48 (for modes 2 and 5, 26 cpl)

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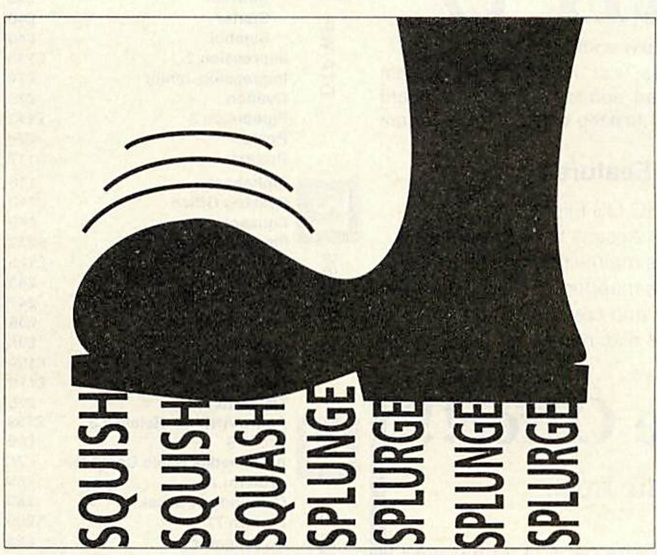
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If you want to produce thin characters, but at a normal width, then width=16 (for mode 0, 80cpl), width=32 (for modes 1 and 4, 40 cpl) and width=64 (for modes 2 and 5, 20 cpl).

This variable sets the character spacing. By increasing the value of the spacing variable, expanded characters can be printed. Also, the lines between the labels loop3 and endloop and between cont and end are removed, then standard characters are printed in condensed form.

Note that the code does not perform any carriage returns, so the routine is only good for printing one line of text at a time. To print subsequent lines, the graphics cursor needs to be moved manually to the start of the next line, as shown in the example program provided in the yellow pages (and also on the monthly disc), which prints a few of lines in both normal and inverse video.



The program resides in the usual space at &900 in the BBC memory map. It occupies less than one page of memory, and so does not conflict with other programs, provided the serial buffers are not used.

To use the program, run or type in the source listing, and a machine code file called CONDENS will be generated. This must be loaded before the routine is used. Then within your main program, allocate the text you wish to print to a string variable, move the graphics cursor to the required printing position, and CALL &900,x$, where x$ is the name of the string variable.

Remember that the graphics cursor starts from 0,0 in the bottom left-hand corner of the screen, unlike the text cursor which starts at the top left-hand corner.

Also, remember that if the graphics origin is altered, or a graphics window is defined, then this will be reflected in the output from the program.

The program works by reading each character from the character matrix using OSWORD &0A, and condensing it into six vertical lines. Then a spare character (Ascii 159) is defined to the new pattern generated and finally this character is printed to screen.

The graphics cursor is advanced six pixels only, and the process is repeated for each character in the string.

Possible uses of the program include labelling of graphics, games, and other applications where text legend space is fairly tight.

David Atherton

CadMust is a multi-tasking CAD System for the design of electronic circuits, operating in the RISC OS environment.

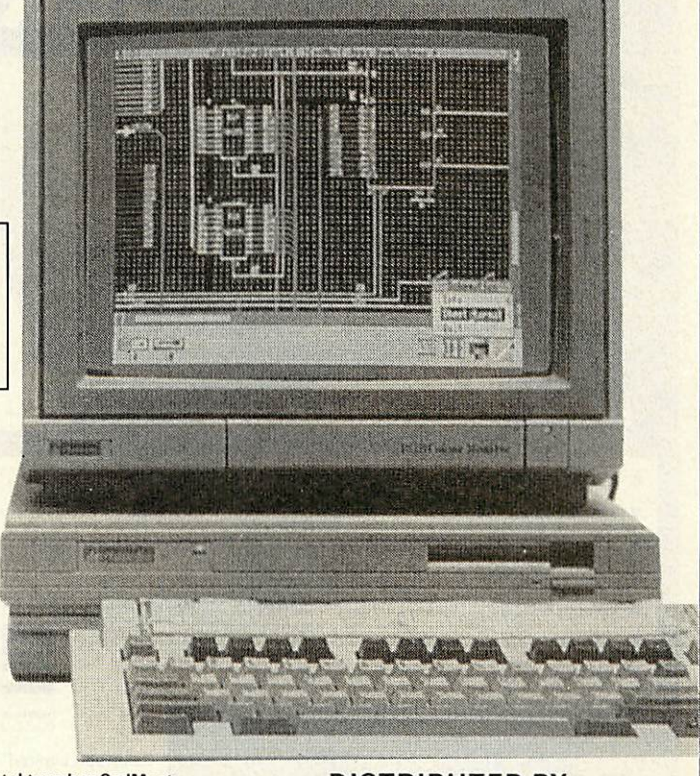
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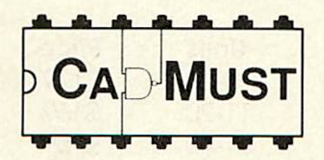
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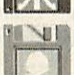
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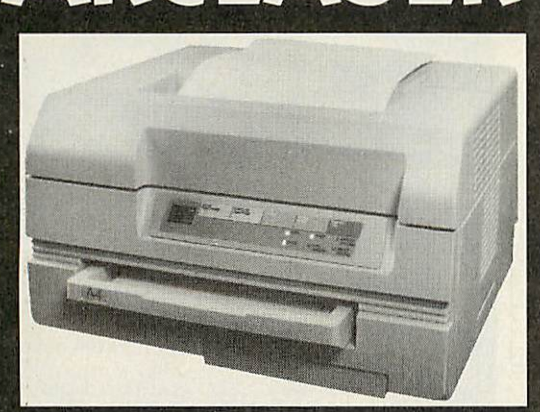


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BATTLING RAM

Programs to protect your programs, yes. But programs to destroy programs... that's something we'll leave **EMMET SPIERS** to explain

Computer programs lurking in the depths of the memory doing their damnedest to wreak havoc is every computer user's worst nightmare. Laying data bombs, replicating exponentially and deviously avoiding detection are all techniques utilized by these destructive programs. However, when tamed and released into a controlled environment, watching these programs do battle is not only safe but very enjoyable! *Core War* is a game that lets you do just this, the 'players' are computer programs and the object of the game is to irreparably damage the opponent's program.

This game, invented by A K Dewdney and first catalogued in his Computer Recreations column in *Scientific American*, is contested by two battle programs written in a language called Redcode, a simplified subset of 6502 assembler. An executive program called *MARS* (Memory Array Redcode Simulator) shares out the simulated processor time between the two programs which have been loaded into random locations in the core (memory) at least 1000 locations apart. To reduce program development time a Redcode assembler can be used to convert the Redcode mnemonics into object code for execution by *MARS*.

At this point I am worried that mentioning assembly code will turn you off. Please read on. Assembly code is not difficult and, in some respects, it is simpler to write than Basic.

The game takes place in an array of memory – the core – which is, preferably, 8000 locations long (unfortunately the eight-bit micros do not have enough memory and their core is 4000 locations). The memory is cyclic, the last location (eg, 7999) in the core precedes the first (eg, 0). Programs are executed sequentially from the first statement to the last, unless any branch instructions are met, and a program loses if it attempts to execute a non-executable statement. Since the starting point is random, sometimes one program will, by its nature, have an advantage, so to be fair the winner is the program that wins on average over several games.

One of the shortest programs in the *Core War* is *Imp* – MOV 0 1. When this is executed, the instruction copies the location that is 0 away from it to the location that is one away – it copies itself forward one location! Since execution then proceeds to the next location, the one just copied to, this program happily plods along the whole of the core, leaving a trail, one location at a time.

It is time to get down to the nitty gritty of the language. The following program gives some



Illustration by George Snow

examples of Redcode's most important features:

```
        DAT   -1
start   ADD   #5    -1
        MOV   #0    @-2
        JMP   -2
```

This program is called *Dwarf* and it places a data bomb on every fifth core location. Figures 1, 2 and 3 should help you understand what is happening. The location currently being executed is highlighted as grey and the program counter is at this location. The first statement is DAT. This is the non-executable statement and it

FIGURE 1

99	
100	DAT -1
101	ADD #5 -1
102	MOV #0 @-2
103	JMP -2
104	
105	
106	
107	

FIGURE 2

99	
100	DAT 4
101	ADD #5 -1
102	MOV #0 @-2
103	JMP -2
104	
105	
106	
107	

FIGURE 3

99	
100	DAT 4
101	ADD #5 -1
102	MOV #0 @-2
103	JMP -2
104	DAT 0
105	
106	
107	

can also be used to store data values. *Dwarf* uses DAT in just this way. The first executed statement (see figure 1) is ADD and it uses two addressing modes, one for each number. An addressing mode is a way of accessing the core – Redcode has four ways. The # denotes immediate addressing, the number specified after the # is used without modification and the absence of any character before the -1 denotes relative addressing. This means that the location so-many away from the current one is used (in this case -1 or one behind the ADD statement).

The next statement, MOV, contains immediate addressing and a new addressing mode – indirect addressing (this time denoted by an @). Indirect addressing is the most complicated form of addressing and figure 2 shows how it works. The location to be acted upon is found by initially considering the relative location (in this case two behind, location 100 in figure 3).

The final location is the one pointed to by the number stored at this location (four) relative to this location (100), in figure 2 @-2 points to location 104. The final statement (figure 3) sets the program counter to relative address -2, back two and pointing to the ADD statement. Since the program counter is now at the beginning of the program, the whole program loops again and again, each time placing a DAT #0 five locations further forward in the core – a deadly program.

Any program bigger than four statements is bound to be hit by *Dwarf* so what alternatives are there? Well the competing program could try to hit *Dwarf* first, move away from the attack or it could try to repair the damage.

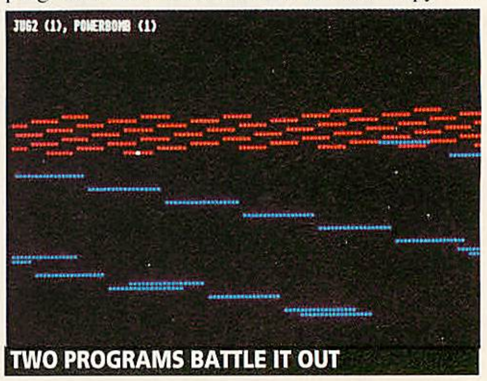
The first alternative requires a better destructive algorithm. A more successful method is to avoid or repair the attack. To be able to do this you need to copy the program from one area of the core to another. The program I use is called *Gemini* and it also illustrates the fourth addressing mode:

```
        JMP    .1
.0      DAT    5
.1      MOV    #5     .0
        MOV    #100   .3
.2      MON    @.0    <.3
        DJN    .2     .0
        JMP    @.3
.3      DAT    100
```

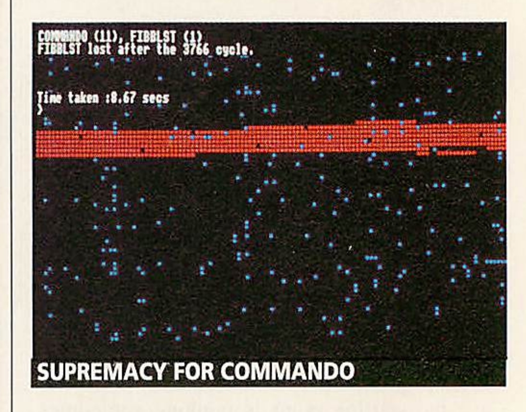
This is an example of a fully fledged Redcode program written using the label facilities of the assembler. You may notice the numbers in the margin are preceded by a full stop (.), these are called labels (much like BBC Basic's assembler). Labels are not variables, they cannot change, but are markers to memory locations. They can only be declared once (by placing the label on the left-hand side of a statement) and having done so, any reference to them will be substituted by the appropriate relative address, this makes writing Redcode programs much easier. Labels are limited to two digit numbers, but that should be quite sufficient for any battle program. The initial JMP statement is required because *MARS* (the executive program) always begins by executing the first statement.

The first and second statements (from .1 onwards) ensure that the locations .0 and .3 are set to the correct initial values, the statements MOV @.0 <.3 and DJN .2 .0 are the centre of the copying routine. MOV @.0 <.3 introduces the final addressing mode and shows how it can be used to create a very efficient, hence fast, copying routine. Firstly the location at @.0 is fetched, to start with this location is five away from .0, the statement JMP @.3. Then this location is copied to <.3, using the new addressing mode called auto-decrement indirect. This addressing mode firstly decrements (subtracts one from) the relative location .3 and then the addressing mode behaves exactly like indirect addressing with the location .3. Hence the statement subtracts one from the location .3 (making the location DAT 99) and then copies the statement pointed to by @.0 (JMP @.3) to the location pointed to by @.3, the location that is (now) 99 locations away from .3.

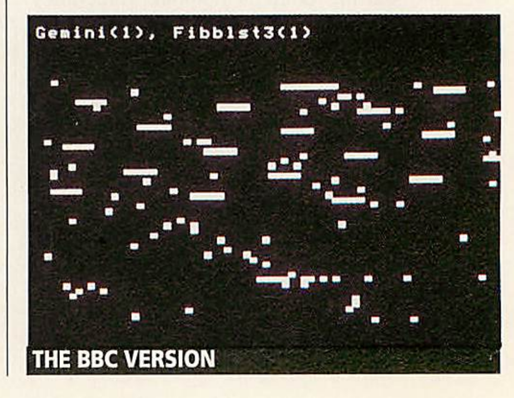
DJN .2 .0 in comparison is a very simple instruction, it decrements relative location .0 and jumps to the location .2 if the location .0 is not equal to zero. Hence the program loops around, copying itself from tail to head 99 locations onwards. The final statement, JMP .3 is executed when all the program from JMP @.3 to MOV #5 .0 has been copied and the address @.3 now points to the location last copied, the first location in the program. This means the execution of the program is now transferred to the new copy and



TWO PROGRAMS BATTLE IT OUT



SUPREMACY FOR COMMANDO



THE BBC VERSION

the whole process begins again.

You'll find the programs in the yellow pages (or on the monthly disc). Firstly, there is the assembler. Without this, programming in Redcode would be very tedious, secondly there are two *MARS* environments, one for the eight-bit machine and the other for the Archimedes.

BATTLE PLAN

Now that you have the necessary programs to play *Core War* you must create some warriors to do battle with. I suggest you start with the three battle programs I described above – *Imp*, *Dwarf* and *Gemini*.

The easiest way to create battle programs is to type them into a wordprocessor or text editor. If you do this, be careful not to add formatting instructions (TABS are acceptable), make sure the final line ends with a RETURN and, if possible, save the file as Ascii using a spool option.

I will call the program that you have just typed in the source code, this is because *MARS* cannot read it, but *AssemCo* can convert source code into object code which *MARS* does understand. The next stage of preparing battle is to assemble the source code. To do this you need to run *AssemCo* by typing: CHAIN "AssemCo".

If the program runs correctly, you will see the value of mem that *AssemCo* is using. If this is not correct (the BBC version has to be changed to 4000) then you may want to press ESCAPE and change the appropriate line now. *AssemCo* asks you for the Source file, this is the filename of the source code that you have previously entered. The program will then ask what filename to save the object code under.

If you have a disc system then I recommend that you use a directory S to store source code in and a directory O to store object code. This allows both the source and object code to have the same filename (with ADFS these directories must be created with *CDIR <directory>). If you use a tape system then I recommend you use one tape for source code and another for object code.

The object code filename should be typed in (including the O if you are using directories) and then the assembler will set to work producing the object code. The assembler will print out the object code and source code of each line as it processes it but the whole assembly should not take long. Finally the assembler asks you to 'Press any key to save', giving you time to change disc or tape.

To play the *Core War* you need at least two warriors, so you now need to go though the whole process again.

Once some object code warriors have finally been created you can watch them do battle. Run *MARS* as appropriate and you will be asked for the battle program's names. These are the object code files that *AssemCo* saved. Once you enter two names the battle begins, only ending when one program executes a non-executable (ie, DAT) statement and terminates.

When battling, the top line of the screen displays each of the battle program's names followed by a number, this number will be explained later, the rest of the screen represents the core. Each core location is represented by one graphical square, initially the only core locations marked will be where the battle programs have been loaded.

The eight-bit version marks core locations with white teletext graphics squares and the program counter is denoted by a flashing teletext square. The other version denotes each battle program by their own colour and the program counter by a white square, this means that you can see which program has altered any particular area of the core.

I have completed my description of Redcode by explaining the function of the remaining instructions. You will find an explanatory table in the yellow pages and it has a complete list, the majority of which is quite obvious. The column Arguments tells you whether you need one or two addresses with the instruction (labelled A and B). With the single address commands it is not important that you have extra spaces in your source code if only address B is required.

SUB just subtracts two numbers and could quite easily be replaced by ADD -A B, but using SUB makes the source code much more readable.

JMZ and JMN are very similar, both look at the contents of the address pointed to by B, if the contents are equal to zero then JMZ behaves exactly like JMP and alters the program counter to location A, if the contents of B are not equal to zero then JMN does a JMP.

CMP compares the contents of address A with the contents of address B. For a match, both locations must be exactly the same (instruction, addressing modes and addresses) unless immediate addressing is used and then only the B argument of the addressed location need match the immediate argument. If the locations match, then the next instruction is skipped (note that this is the opposite to 6502 assembler).

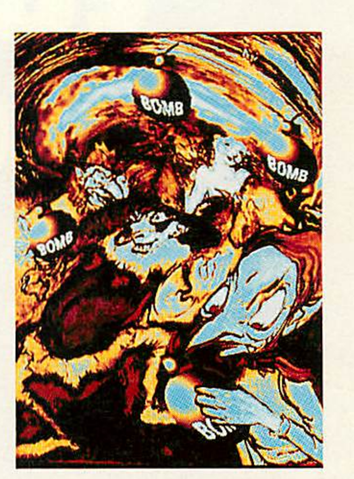
The final, and potentially the most interesting instruction is the SPL instruction. This allows battle programs to have several different programs or tasks running concurrently, well almost. The argument of the SPL instruction points to the location where the new task will commence execution from. Programs can have up to 64 tasks running. If a program tries to create any more, then the SPL instruction will just be ignored.

To be fair to one program that uses fewer tasks than another, not only does *MARS* share out the execution time between the battle programs but also divides any battle programs' share between all its executing tasks.

This means that a battle program trades off speed with the number of tasks it has running – the more tasks the slower each one goes. Some programs can use this powerful feature to great effect and, in general, the most successful battle programs use this command.

To take account of SPL in the rules of *Core War*, a battle program now loses when none of its tasks remain running, and this explains the numbers in brackets after the battle program's name on the *MARS* screen – the numbers represent the number of tasks that each battle program has running.

Well, that completes the description of the *Core War*. Hopefully you can now develop your own battle programs. Perhaps *BBC Acorn User* will even publish the best of your efforts. Meanwhile, happy battling!



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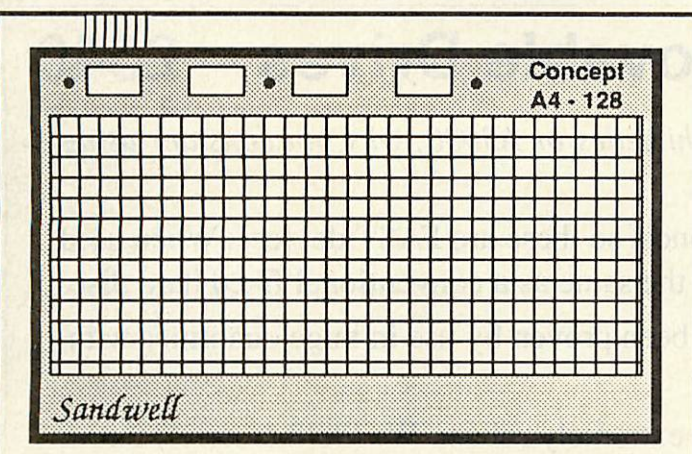
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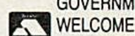
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CONFIGURE IT OUT

More advice on how to configure the A3000 and make more use of Edit's capabilities

In the first article in our series on using the BBC A3000 we described how to use the *Configure* application. This allows you to alter the battery-backed Ram in the machine, ie, the area of memory that the computer examines every time you check the status of such things as the sound volume, or the mouse speed.

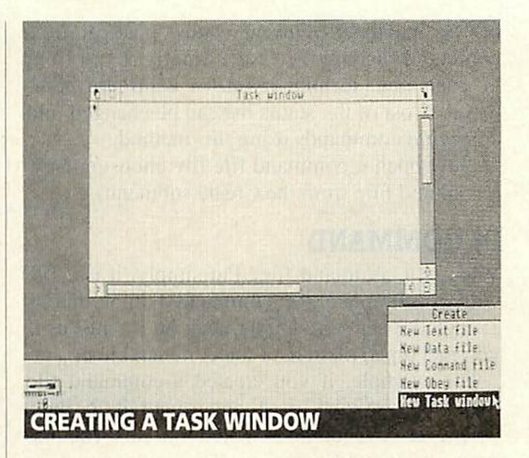
However, there are many more configurations that can't be set using this application. In this article, we show you more about configuring your machine, and a little bit about the *Edit* application as well.

Press the Menu button on the mouse with the pointer over the *Task* application (in the bottom right of the screen) and choose *COMMANDS (you can also press F12), which gives access to the command line.

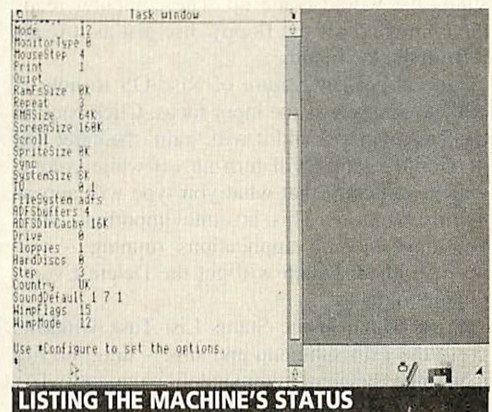
Type STATUS and press RETURN. What follows is the status of the battery-backed Ram of your machine. The list is longer than the screen and, when it reaches the bottom, the computer will wait for you to press SHIFT before carrying on. Press RETURN to get back to the desktop.

Some configuration commands are useful, while others are essential. For example, press F12 to access the command line again and hold down the R key – note how quickly (or slowly) the Rs progress across the screen.

Press CTRL-U to delete these Rs (this deletes the current line) and now type *CONFIGURE REPEAT 3, then press RETURN to send this command to the computer's command interpreter to be executed (the interpreter will accept any mixture of upper and lower case characters). Now press CTRL-BREAK. Don't forget that for the majority of configuration commands, the machine only checks them when you switch on, or use reset. So, for many of them to take effect, you will first have to reset your machine.



CREATING A TASK WINDOW



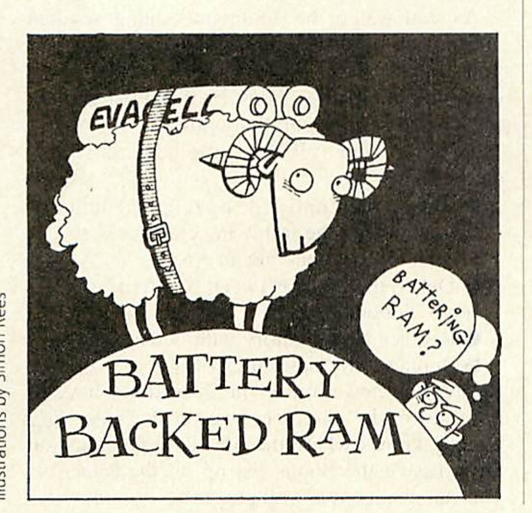
LISTING THE MACHINE'S STATUS

Press F12 again and hold down the R key – note how much faster the Rs stream across the screen? Your machine will remember this setting, even when you turn it off. The REPEAT option is, in fact, the amount of time (in hundredths of seconds) that the computer waits before repeating a key stroke. This is how I prefer to set my own A3000 – you may have other preferences.

Now go back to the desktop and load *Edit*. Press Menu over the *Edit* icon and choose New Task Window from the Create submenu. This new window behaves like a desktop version of the command line (notice the star prompt) and if you type STATUS in this window, the machine's status will be listed as before. After it's finished scrolling by, press Menu and choose Kill.

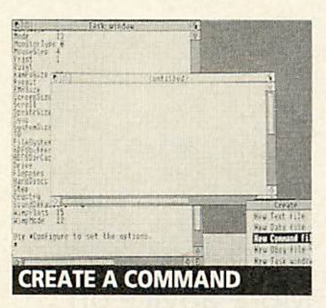
Sometimes you will need to completely reset your machine's status after it has been altered or lost (some less well behaved games can do this).

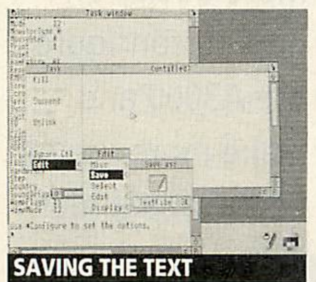
As the status list is how your machine is currently configured, you can use this list as a way of remembering it. You can cut out the list

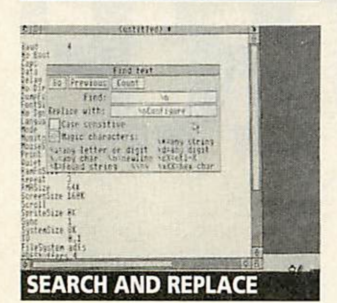


Illustrations by Simon Rees




CREATE A COMMAND


SAVING THE TEXT


SEARCH AND REPLACE

of the machine's current status, place it in a command file and then put a 'configure' in front of each one, turning it into a configure command. Most of the status list can be changed into configure commands using this method.

Now open a command file (by choosing New Command File from the Create submenu).

IN COMMAND

What is a command file? Put simply, it is a file with a command (or commands) in it that is executed when you double-click on it – just as if you had typed them in at the command line.

For example, if you created a command file and typed STATUS in it and saved it to disc, whenever you double-clicked on this file the status list would come up. The computer reads the command off the floppy disc just as it reads it from the keyboard.

One important feature of Risc OS to note is which window has the input focus. Click back in the Task window and it will 'gain' the caret and its Control icons will turn an off-white colour, which indicates that what you type will appear in this window. This is quite important when you have several applications running – you want to know which will get the Delete Everything command!

Press Menu in the Status List Task window, go to the Edit submenu and save – drag the file icon into the new command file window. The status list is transferred into the new command file. You can now close the Task window (*Edit* will ask if you are sure, so click on Yes). Press the HOME key to move the caret to the top of the cutout status list in the command file.

Press COPY (it deletes forwards) until Baud is on the top line, flush with the left-hand side of the window. Press RETURN once to move the list down one line.

Press CTRL and the down arrow (to move the caret to the bottom of the text) and delete any spurious characters from the end of the list (so that the caret rests against the 12 after Wimp-Mode). Place a newline character at the end, by pressing RETURN.

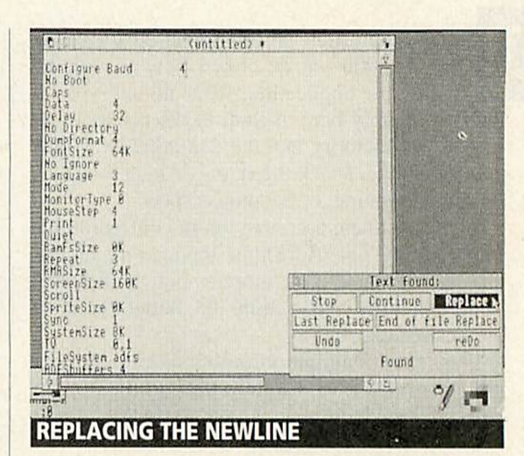
Now you need to put Configure at the beginning of each line, by using the arrow keys to place the caret at the beginning of each line and typing CONFIGURE.

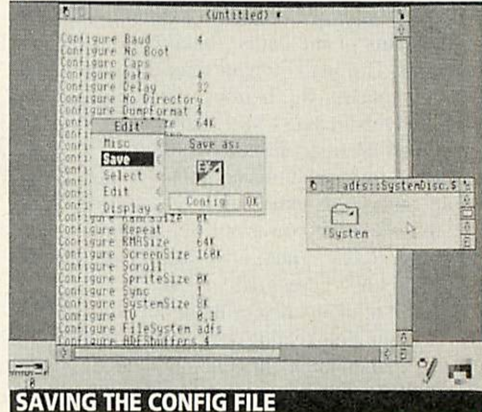
GOING IN SEARCH

A quicker and far more elegant way of doing this is to use *Edit*'s search and replace facility. You need to place a Configure command at the beginning of each line, so you need to change all the newline characters (the character that tells *Edit* to put text on the next line) to a newline character, followed by Configure.

Do this by going onto the Find box in the Edit submenu. Notice that you can also bring up this dialogue box by pressing F4. Click on Magic Characters to enable you to search for a newline. Type \n (this is how such a character is denoted in *Edit*'s Find box – a newline character is created when you press RETURN, but if you press that key the caret goes onto the next box. Type \n in the Find box and press RETURN, type \nCONFIGURE followed by a space in the Replace box and press RETURN.

Edit will now find the first newline and bring


REPLACING THE NEWLINE


SAVING THE CONFIG FILE

up the Found dialogue box. If you click on Replace it will replace the found newline with a newline, followed by CONFIGURE – the effect, as you can see, is just what you want.

Click on End of File to replace the rest of the newlines in the file, and then click on Stop.

Bring up the directory viewer of a suitable floppy disc (perhaps your system disc or a copy of Applications disc 1) to save this command file onto. Use CTRL-U to delete the standard filename, give it a suitable name (like Config) then drag the icon onto the directory viewer.

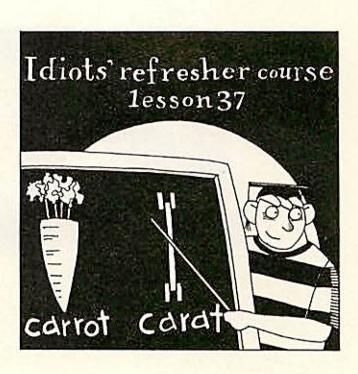
Although most of the status list will translate directly into configure commands, a couple don't. To see these, double-click on the file. If it goes by too fast, holding down the CTRL key can slow down the scrolling. Also if you hold down the SHIFT key, while still holding CTRL, you can stop the scrolling completely.

As you watch the commands being scrolled and passed onto the command interpreter (as if you'd typed them), you can see which ones the computer complains about, ie, those that are not recognised as configuration options.

To make your A3000 a little happier, simply do the following:

- Reload the Config file by dragging it onto *Edit* and make the following changes to the commands that generate an error
- Delete the space between No Boot, so it reads Noboot
- Replace No Directory with NoDir
- Replace No Caps with Nocaps

Resave the new Config file (you don't have to drag it to the directory viewer because *Edit* already knows where the file is, so just click on OK). Leave the Status list up on the screen so you can change it as you progress.



One vital aspect of the configuration options is memory management. Your A3000 probably has 1Mb (1024Kb) of memory, which is shared out for various uses. For example, the screen display needs 80K in mode 12, and you may have a small amount for a Ram disc.

MEMORY MANAGEMENT

The problem of each part of the machine having different memory requirements is solved by a common memory 'pool'. When you run an application like *Edit* it checks the amount of memory in this pool, and if there isn't enough left, it won't load. However, you do have some control over how memory is shared out.

Press Menu over the Task application and choose Task display. At the top of the window are applications currently running and how much memory has been taken up. The fact that the bar is green signifies that this is a fixed amount, although some applications will allow you to alter the amount of memory they can use.

The memory pool is represented by the two bars marked Next and Free. When your machine gives you an 'out of memory' error, it is up to you to increase the free space available. The easiest way is to quit some applications, but you may be able to squeeze more out of the machine without doing this.

The screen memory is entirely dependent on which mode you are using – mode 0 uses the least, at 24K. If you are ever really tight for memory then changing to mode 0 will free quite a lot, and even though it doesn't look that good, the machine is still perfectly usable. In the Status list you can put 0K after Screensize.

The next changeable bar is the system stack and, like the screen memory, it generally looks after itself. In the Status list it is called System-size and it should be configured to 0K. If you ever get a 'heap full' error, then increase the heap size by 8K using its bar. Of course, if you continually get this error then you can configure it to 32K.

The module area again looks after itself. You may be able to squeeze a few drops out of it by grabbing the bar and dragging it back down. You should, however, configure it so that initially it has 64K free. You can do this by changing the parameter after RMAsize (relocatable module area) to 64K.

You should always have memory for the font cache, otherwise you may have problems when you load a drawfile. Set the font cache, which is listed as Fontsize in the Status list, to 64K.

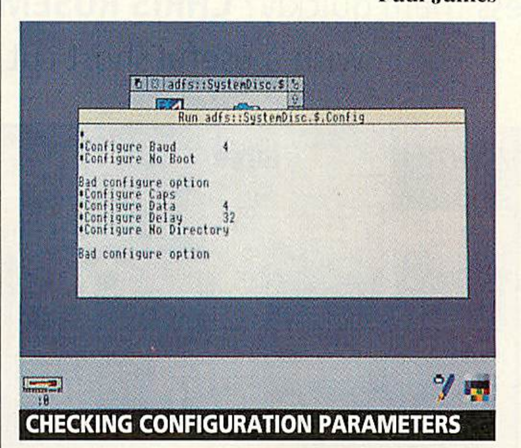
The system sprite size (spritesize) should be set to 0K, but if you ever run a program that moans about having 'no room to get sprite' or something similar (generally from non-desktop applications, such as *Atelier*) then give this area a bit of memory before trying again.

Finally the Ram Disc (as discussed in an earlier article) should be configured to 0K (using RamFsSize) and only given memory when you wish to use it. Now, when your machine gives you an 'out of memory', 'not enough memory within *Desktop world', or '*Paint* has run out of room' error message, you'll know enough to redistribute the memory.

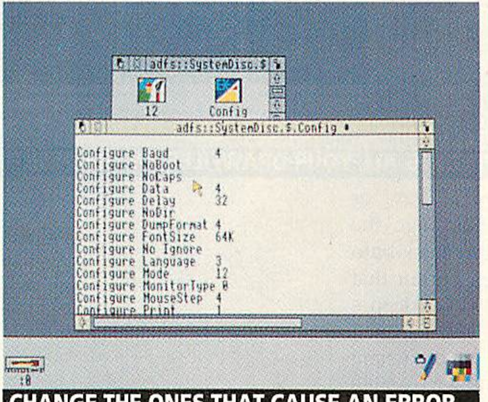
It is worth experimenting with the configuration of your machine. Don't worry – you can't do any damage and you can always double-click on the saved status (that command file) to reset it back to what it was. But *don't* change Monitor type or Sync – these commands are only used when you're using a multisync monitor, and changing them will mean that your computer doesn't send the correct signal to your monitor and you won't be able to see what you're doing. If this does happen, you'll have to do an R reset (holding down R while turning the machine on). This completely resets your machine, but you can always set it back to the state it is in now by double-clicking on the Config file.

Take a look in your A3000 user guide under Configure. You will find a full description of what each command does. Another part of your user guide to read is the appendix on error messages – you are likely to see more of these as you get to know your A3000 better, so it pays to know what they mean!

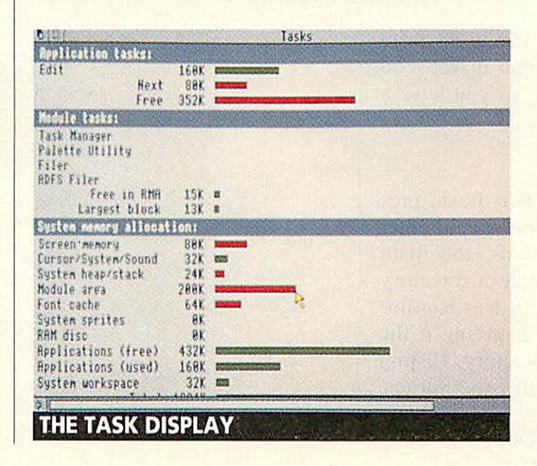
Paul James



CHECKING CONFIGURATION PARAMETERS



CHANGE THE ONES THAT CAUSE AN ERROR



THE TASK DISPLAY

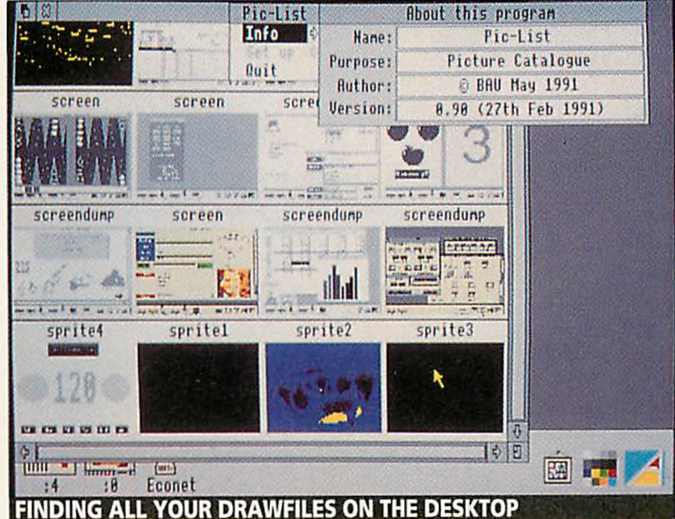
● Next month, we'll attempt the monumental task of bringing all three applications – Draw, Paint and Edit – together and show you just how powerful multi-tasking can be.

Meanwhile, if you have been following the series and want to ask any questions about your A3000, send them to the editorial address listed on page 3, marking your envelope 'A3000 First Steps'. We are collating the questions and will publish selected answers in a later issue.

A free one year subscription to BAU (including the monthly disc) will go to the first letter we select each month from the A3000 pile. (This competition will run for the duration of the First Steps series only).

PICTURE THIS

The Arc is great for producing graphics files, but how can you access them quickly? **CHRIS RUSEMAN** has come up with a useful short cut



FINDING ALL YOUR DRAWFILES ON THE DESKTOP

Interest in computer art is booming, but this brings with it certain practical problems, not least of which is the number of graphics files you can accumulate.

No matter how well you keep your discs in order, it can often be tricky to track down a particular sprite in a long-misplaced file, which is why I decided to develop some kind of visual indexing system. The result is *PicList*, a picture file cataloguing system which takes the form of an Archimedes desktop application.

The basic idea is simple. Drop a draw or spritefile onto *PicList* and it will arrange the pictures into a grid. If you drop a directory onto *PicList*, then all draw or spritefiles within that directory – or any subdirectory, however deep – will be added to the index.

The result is one or more index pages, where every sprite or draw image is shown, scaled down if necessary, together with its filename or sprite name as required.

The pages themselves can be saved as sprite files, and saving them onto a printer driver icon will allow you to print them out, so you have a permanent catalogue.

PIC-LISTING

In all there are three listings – two Basic programs and an Obey file which you should enter using *Edit*. Like many applications, the main program is rather long. First create a directory called *PicList* and in it save listing 1 as RunImage. Then enter and run listing 2, giving it the full pathname of your *PicList* directory. Listing 2 creates two files, called Templates and Sprites, in the application directory.

Finally, enter listing 3 as an Obey file using *Edit* and save as Run. When all this is done, simply double-click on *PicList* from the desktop and its icon will appear on the icon bar. Click on *PicList* to bring up the catalogue window, and then drag files or directories onto the window or icon for inclusion.

There are several options on the main menu, brought up by clicking the Menu button over the *PicList* window. Save behaves in the standard Risc OS way. The currently visible page can be saved as a sprite, either in a directory or to an application, such as *PrinterDM* or *Paint*.

The next three options are used to skip back and forth or jump to pages of the index. If you have dragged enough images onto *PicList*, additional pages will be created as necessary. The current page number is shown in the window title. The last option, Clear, wipes the current index. Closing the *PicList* window has the same effect.

Memory is claimed from the free pool as and when it is needed for new pages. When you Clear or close the window, the memory is returned to the pool. Because only a small 'snapshot' of each picture is taken, it is possible to build a large catalogue of images.

You can also vary the size of the snapshots or alter the mode used for them to save on memory. For 256-colour images, you might use a mode 15 sprite for the catalogue. However, using a mode 0 one will save on memory and, although all your images will be converted automatically to black-and-white, the index will usually be clear.

You can only alter the size and mode of the catalogue when the *PicList* window is closed (ie, when there are no images loaded). The Setup

menu is used and there are several submenus from this. The Label submenu provides two options – Path and Leaf, either of which may be on or off.

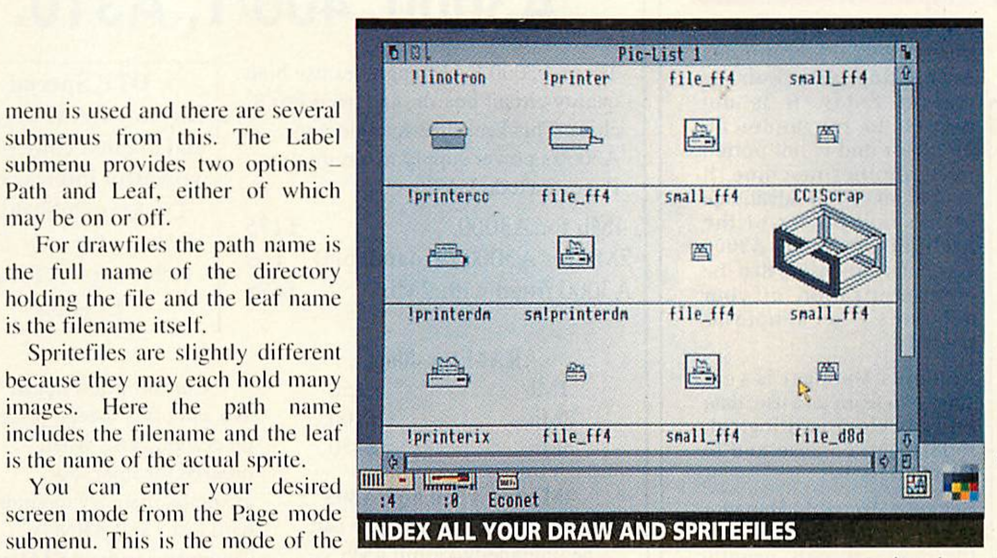
For drawfiles the path name is the full name of the directory holding the file and the leaf name is the filename itself.

Spritefiles are slightly different because they may each hold many images. Here the path name includes the filename and the leaf is the name of the actual sprite.

You can enter your desired screen mode from the Page mode submenu. This is the mode of the sprite on which the catalogue is drawn and any valid screen mode will do. The Page size submenu allows you to set (in OS units) the size of each catalogue page. The Grid submenu is used to set how many entries there will be across and down each page. You might need to reduce the across value if, for example, you turn full labelling on. Names are shortened and prefixed with "..." if they don't fit.

The final option, Auto set, is only lit if a printer driver is loaded. Select it to set the page size to match the paper size of the driver. If you intend printing out your catalogue, use Auto set (or load the printer driver first) and the catalogue will fill the paper neatly.

The main program is a bit too chunky to describe in full detail here. Many parts of the code are identical or similar to applications carried in previous *BAU* pieces. In particular, you might like to look at the *Stretch* application I wrote for the September 1990 issue (page 72).



INDEX ALL YOUR DRAW AND SPRITEFILES

HERE'S A PROGRAM TO HELP YOU FIND YOUR VALUABLE ARTWORK FAST

TEXT AND FONTS

When a file/directory is dragged onto *PicList*, it is passed to PROCscan. This is a recursive procedure that goes through all subdirectories looking for sprites (passed to PROCsf) or drawfiles (passed to PROCdf). In either case, scaling and colour translation takes place.

The code to render drawfiles is similar to that used in *Stretch*, but with a few additions. Text and fonts are now dealt with correctly. Fonts are given as a list of numbers and names towards the start of a drawfile and are subseqently referred to by number only. If the text is in the system font (or in a font that can't be found) it is plotted using VDU 5, having first set the size of the text with a VDU 23,17,7 sequence. Text in a valid font is plotted using "Font_Paint".

Each drawfile has a bounding box which is used to calculate the scaling required. Because they are stored as a set of objects, drawfiles are easy to scale. Sprites have to be scaled by building a table of factors and using a special "OS_SpriteOp" call.

Images are plotted by redirecting output from the screen to the current page sprite. This has a few problems associated with it because you are, in effect, performing a double translation. For example, you might be taking a mode 15 sprite, scaling and plotting it on a mode 0 sprite and displaying that sprite in mode 12! In general, calls are provided to find the best colour to use given the current mode and palette. Redirecting output to a sprite that's in a different mode to the screen will therefore cause problems unless you are careful. The "ColourTrans_ReturnColourNumberForMode" call will indicate the closest colour to the one you want, given an arbitrary mode and palette, and this is used in PROCdrawcol. The call ColourTrans_ReturnFontColours assumes you are plotting to the screen. Therefore, in PROCtext you have to set up the font colours manually (using that call with the very long name again!).

Palettes pose a further problem when it comes to defaults. Many ColourTrans calls that take a mode number as a parameter also take a pointer to a palette. If 0, the palette is assumed to be the default for the mode. In this case the default palette – flashing colours and all – is fairly useless. What in fact is required is the desktop palette for that mode. I cheat and build a desktop palette that matches the real one. The procedure FNwpal returns the address of a desktop palette for a given mode. In 16 colour modes this is the actual palette but, in 256 colour modes, 0 is returned, indicating that the default palette is OK to use.

A flexible heap is maintained by the application. Memory is taken from the free pool (using "Wimp_SlotSize") when needed. Because the heap is only used for the page sprites and a list of their addresses you can easily give the memory back when finished just by resetting the whole heap (see PROCreset).

For simplicity, direct memory transfers between *PicList* and other applications (eg, *PrinterDM*) are not implemented. Instead, the Wimp scrap file is used. When saving a page onto the *PrinterDM* icon the procedure is:

1. *PicList* is informed that the save box has been dragged and dropped
2. Find out where the box landed, and reply with an 'I want to save something' message
3. *PrinterDM* replies with an 'OK, go ahead and save' message
4. Save the sprite file using the expanded name given. In fact this is the name of the Wimp scrap file
5. Finally, send a 'load file' message back to *PrinterDM*
6. *PrinterDM* loads the scrap file, deletes it and returns acknowledgement

There are many ways in which *PicList* could be further enhanced. You might like to add code so that you could display other objects (eg, *Euclid* files). More ambitiously, it would be useful to be able to sort images alphabetically, etc. In this case the pictures, or whatever, would have to be kept as separate sprites and arranged in an intelligent manner.

Meanwhile, *PicList* should help take the 'temper' out of your artistic temperament when it comes to finding your valuable artwork fast.

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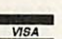
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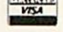
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If you want to add some style to those 24-pin printouts, **DAVE LAWRENCE** has a program which is full of lively characters

FONT FANTASY

ALL YOU NEED IS A BIT OF PROGRAMMING TO DESIGN YOUR OWN CHARACTERS

Printer technology has progressed in leaps and bounds over the last few years. It seems like only yesterday when nine-pin printers were the 'next thing' in speed printing, while daisywheels were used for 'quality' output.

Today, the ubiquitous laser printer can produce fast, high quality output, the only problem being the price – paying out £1000 for a printer is difficult for most users to justify.

The cost-effective compromise is a 24-pin printer. With *PrinterDM* running on an Archimedes, you can produce some very impressive results using the Archimedes' own outline fonts, often with resolution comparable to that of a laser printer.

This is all very well for the high-flying Arc users, but what about the thousands of BBC owners out there – how can you produce fancy text with such a printer?

Well, all of these printers can be driven in so-called 'bit image mode', in which the stream of data sent to the printer is not printed as Ascii characters, but interpreted as a series of 1s and 0s that directly control the pattern of dots printed. This is handy for producing screen dumps and the like, but very time consuming for printing text.

Some 24-pin printers have a number of built-in fonts, usually Roman and Sans Serif, sometimes with a couple of others thrown in for good measure. Unfortunately, my LQ800 (as far as I know, the first 24-pin printer) only has Roman. It does, however, have a large edge connector hiding behind a panel on the top, designed for font expansion cartridges – rather like sideways Roms in the BBC.

Once installed, you can select the new fonts with an escape sequence in a similar way to selecting bold or italic printing. The only problem with this, apart from the fact that cartridges cost money, is that I've never actually seen them on sale – anywhere.

So, is it back to square one? Not necessarily – remember that old saying 'If in doubt, read the instructions'? Well, if you read page 37 of the LQ800 reference manual, it says that ESC & can be used to define user-defined characters. Now all you need is a bit of programming to design your own characters.

All the character data will have been transferred to the printer to output it and any emboldening, underlining, and so on will be done automatically.

THE PROGRAM

The program is too long to fit in this month's yellow pages, so it will appear in two parts with the second part next month. However, the program is on the monthly disc (see pages 29 and 99).

As with all long machine code programs, I've

Illustration by Nick Day

Test Mode	Char Set	Unidir.	Underline	Bold	Italic	BBC Acorn User 24-Pin Character Designer				
Shift	Grab Char	Test One			Exit	Zero L\R	Copy L\R		Clear Grid	Clear All
Function	Goto Char	Test All	Load File	Save File	Print Mode	Left Extra	Right Extra	VDU 1,s?	Line Space	Undo Last

had to split the source code up into a number of sections so that it and its variables, as well as the resulting machine code, all fit in memory. Move the listings Define0 to Define6, and MakeFnt to a freshly formatted disc. Then set the ball rolling by CHAINing *Define0*. It begins by setting up all the variables used by the assembly process – these include zero page locations, character sizes, printer modes, operating system routine addresses, and so on. It then CHAINS *Define1*, which assembles the first part of the editor source code, then *Define2-6* are CHAINed in sequence. *Define6* contains all the data used by the editor when it is running and this last section also performs a number of checksums on the code to see if they have been typed in correctly before the completed editor is saved as *Def24*. You are now ready to use the editor.

On the monthly disc there is also a program to create a font that I designed using the editor just to show that it is possible. It is a basic program, containing the cunningly compacted font as data statements. CHAINing it will decompact it and save the DLsans font to the disc. The only problem with this compression is that it takes quite a while to recreate the datafile, so I have included a 'bytes to go' counter to help you track progress.

USING THE EDITOR

First of all, cut out or photocopy the function key strip – you will almost certainly need it to start with. I'll explain in detail what the function keys do later, but to start with, here is a list of the other keys the editor uses:

Z, X , /, : – Move the edit cursor around large grid
RETURN – Place a dot (White)
DELETE – Remove a dot (Black)

As dots are placed and removed, the large editing grid and the 'actual size' grid are updated. RETURN and DELETE can be held down while the cursor is moving to produce a trail. Note that neither of these grids has the correct aspect ratio – they are roughly twice as wide as they should be. It was not feasible to produce a correct looking editor on the BBC in mode 4 – sorry!

CURSORS – Move to other characters (left and right)
SHIFT+CURSORS – Slide character around within editing grid

Note that any dots moved off the sides of the grid are lost and you cannot get them back by 'sliding' the character the other way.

< and > – Change width in 'fixed' mode
CTRL-Left – Left justify character
CTRL-Up – Top justify character
CTRL-Right – Reflect character left/right
CTRL-Down – Reflect character top/bottom

These last four may need a little further explanation. When a character is justified, it is moved so that its edge (left or top) exactly touches the edge of the editing grid. When left justifying, the number of columns removed are added to the character's 'left space' (see below). The two reflect options have been written so that they reflect the character about its middle, not about any fixed point on the grid.

The following list of funtion keys is in numerical order, so the use of some keys may not be apparent until you have read the whole list.

F0 – Followed by an Ascii key, jumps to that character
SHIFT-F0 – Followed by an Ascii key, copies that character
F1 – Downloads all characters and enters test mode
SHIFT-F1 – Downloads current character and enters test mode
F2 – Prompts for a filename and attempts to load it
F3 – Prompts for a filename and saves current data in it
F4 – Cycles through available print modes
SHIFT-F4 – Followed by Y exits to Basic, any other key continues
F5 and F6 – Changes character's left and right space
SHIFT-F5 – Clears all left and right spaces to zero
SHIFT-F6 – Copies left and right space to all characters
F7 – Toggles VDU 1's flag on/off
F8 – Toggles Space flag none/auto
SHIFT-F8 – Clears current grid (can be undone)
F9 – Undoes any changes made to character
SHIFT-F9 – Followed by Y, clears all characters (no undo!)

When I first started writing the editor, I envisaged having two types of files: one that could be easily loaded and saved by the editor and included all the extra information, such as print mode; and the other that could be sent directly to the printer (with *TYPE) to define the characters. I also wanted a test mode within the editor so that any changes could be tested.

PRINT MODES

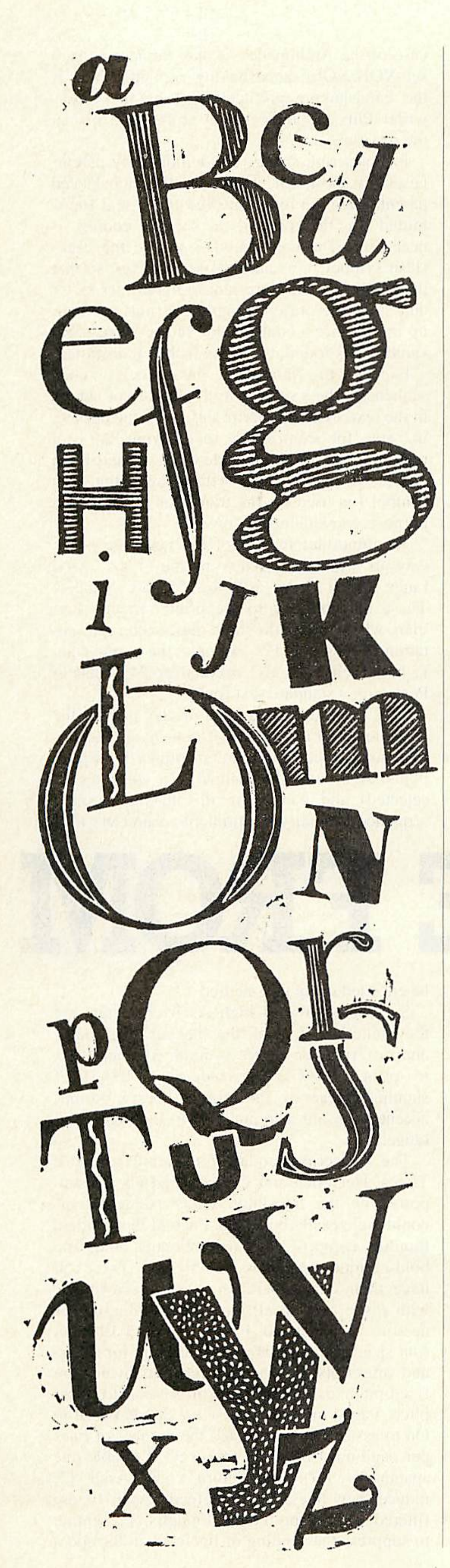
Pressing F4 cycles through the six available print modes. The currently selected one is shown in the status display on the right of the screen. The different modes obviously have different effects in the printed output (eg, whether draft or LQ output is used). They also affect the maximum width of a character.

A small arrow is shown beneath the grid and indicates the maximum width for this mode. It is possible to plot points beyond this range while editing – you'll just be told off about them when you try and save or test the file!

Note that in proportional spacing mode, all the 'black space' to the right of the character is ignored in order to create the proportional spacing effect. If you want to add some extra 'black space' to the right of the character, adjust the character's 'right space' with F6.

The mode names should be fairly self-explanatory, except for Fixed, which is a cross between the usual 10 Pitch and Proportional. If you want to create a font which can have more than 80 characters across the page but is still monospaced, use Fixed. In this mode you can move the width arrow with the left and right arrow keys. When the file is saved or tested, the printer is set to proportional spacing mode, but all the characters are padded out to the same width, thus creating a monospaced font.

I found that my LQ800 manual is hardly expansive on the exact format of the ESC & defining command. It merely says that the amount of data that follows it '...depends on the type of character being defined.' I eventually



discovered that the exact format is: ESC '&' s n m ...data... where s = font family (usually 0!), n = first character to define, m = last character to define, ...data... = for each character between n and m. The format of the data for a single character is l d r ...definition... where l = number of columns before character, d = number of columns of data, r = numberof columns after character and ...definition... = d * 3 bytes of character data, left to right, top to bottom, bit 7 at top.

You can adjust the l and r for each character with F5 and F6, either by pressing them in conjunction with a number between zero and nine or with the up and down cursor keys.

SAVE FLAGS

Remember the VDU 1 and Space flags? Well, these are used when a file is saved. The Space flag can be toggled between None and Auto. If Auto, the editor will find the character that extends down the furthest and set the line spacing on the printer accordingly. In None, the printer's default setting of 1/6th will be used. Note that the printer's underlining will not take into account any reduction in the line spacing.

If the VDU 1's flag is on, each character in the file is preceded by an Ascii 1, a 2 is placed at the start and a 3 at the end. This means the file will end up quite large, but can be *PRINTed directly from Basic. If the flag is off, no extra codes are included, the file will be about 8K long, but you will need to print the file either via a simple loop or by fiddling with *FX3.

All these various flags and modes are naturally included within the file so the printer knows what to do, so it is a fairly trivial task for the editor's load routine to examine any given file and ascertain the original settings.

TEST MODE

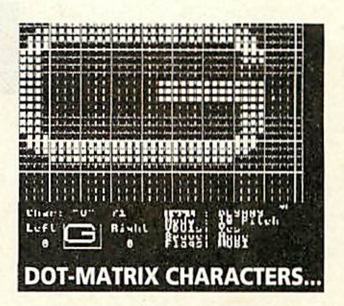
Building in a test mode was relatively straightforward. I already had a routine to save my data in printer readable form to a file, so all I had to do was redirect the final output of this to the printer port. I added a quick check to make sure the printer was on-line and ready and added a fairly simple input routine that reads characters from the keyboard and sends them directly to the printer.

You may have noticed an extra line on the function key strip labelled Test Mode. This is what the extra keys do:

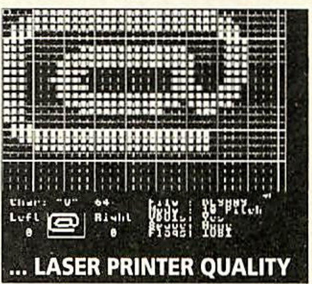
F0 – Print all characters (32-126)
F1 – Toggle Unidirectional printing on/off
F2 – Toggle Underlining on/off
F3 – Toggle Bold on/off
F4 – Toggle Italic on/off
ESCAPE – Leaves test mode

The status of the these togglable flags is shown at the bottom of the status information on the screen. The unidirectional toggle is needed because of a 'feature' when printing individual proportionally spaced characters. If the toggle is off, the printer does not seem capable of positioning the characters totally accurately.

Next month, there will be a program to convert Clare's Fontwise fonts, another font of my own design and some hints on how to go about designing your own fonts. Meanwhile, have fun with the editor and do send in any good fonts you design.



DOT-MATRIX CHARACTERS...



... LASER PRINTER QUALITY

NEW WINE FROM

Hold on to your old wordprocessing software. **DAVID WATERS** finds that it may still have untapped potential when it comes to printout quality

Interword is a popular wordprocessor for the BBC computers. This and other wordprocessors of its vintage were designed to operate with dot-matrix or daisywheel printers.

However, with the increasing amount of text (and graphical) output produced by laser printers from newer DTP packages, you might think that some older wordprocessors are now extinct.

This isn't so! *Interword* and other wordprocessors can easily generate quality output from a Postscript laser printer. The practical and inexpensive solution is to use spooled output from the wordprocessor as an intermediate data source. The spool file – an Ascii copy of the fully formatted printed document – is obtainable from various wordprocessors. I have highlighted *Interword* because it provides an option to include embedded printer codes in the spool file. These codes, usually for a dot-matrix printer, enable the range of styles and effects needed in the Postscript printed output to be used.

You can write a conversion program which reads the file and translates the codes to equivalent Postscript commands. Thus, styles such as bold, italic, underline, superscript and subscript can be fully implemented, and used in conjunction with any of the fonts available on the laser printer. The concept of sending spool files to a Postscript printer has been discussed in these pages before. David Atherton (*BAU* June, September 1989) presented a translator for BBC graphics spool files.

That program could also handle simple text, but for fully featured wordprocessor output, a very different program is needed.

This Basic translator for spooled wordprocessor files (see yellow pages) is designed primarily for *Interword* files containing codes for Epson FX-80 and near-compatible printers, but with relatively straightforward modifications it could be made to handle codes for other printers.

ABOUT THE PROGRAM

There are two principal procedures, PROCprologue and PROCscript. The first of these contains a number of Postscript variable and procedure definitions (the terminology is taken from the Postscript reference manuals published by Adobe Systems Inc), which are downloaded to the printer for later use. The latter is the main text processing section, which intercepts and converts the embedded codes to Postscript commands.

Characters are read from the file one at a time (using BGET#) and strings are assembled for transmission to the printer. This is assumed to be connected to the serial port of any BBC/Acorn computer, and appropriate serial transmission protocols are defined. The protocols given are those required by the Apple Laserwriter Plus.

The BBC models use serial default protocols which differ slightly among themselves, and although most of these coincide with Apple's, it is safest for the program to include them. In the case of the Archimedes, it may be necessary to set XON/XOFF handshaking explicitly (this is the handshaking protocol used by the Laserwriter Plus), as indicated by a REMmed line in the program.

In Postscript, strings are delimited by parentheses. If these (or, more strictly, unbalanced parentheses) are to be allowed for in text transmitted to the printer, a special coding is necessary. The convention is to use the backslash symbol, \, as an ESCAPE character, so that the symbols (and) are sent to the printer as \(and \). In the present program, strings are built up until either a control code or the vertical bar symbol, |, is found; the string is then transmitted.

Except to introduce \nnn octal code sequences, the \ symbol itself should not appear in the text. (The Postscript-defined sequences \b, \n, etc, for controlling text layout are not required here). The characters (,), #, and £ are processed appropriately within the string. The symbol | is used by the translator for a special purpose, as explained below.

An important feature of the language is the way in which characters in the 'high' Ascii range (Ascii codes 128 to 255) are handled. These may be sent to the printer in the form \nnn, where nnn is the three-digit octal representation of the code. For example, the pound sign, £, has Ascii code 163 decimal or 243 octal in Postscript's standard text fonts.

To send this character to the printer the sequence \243 is required. The program handles this automatically, by intercepting the Epson pound sign code (35 decimal, UK character set selected) and converting this to the required sequence. Actually, all printable characters may be encoded using this method

Some other useful high Ascii characters are the 'bullet', 267 octal, the 'dagger', 262 octal, and the 'ring' or degree symbol, 312 octal. So, to print '100°C', the sequence '100\312C' should appear in the original text. Various accents, etc, are also encoded in the high Ascii range.

The Postscript standard font families include Times, Helvetica and Courier, and all are supported by the translator. Other resident fonts could quite easily be added. Each of the standard families comprises normal, oblique, bold, and bold-oblique typefaces or 'styles'. These all have their counterparts in the styles available with *Interword*, so all the corresponding codes need to be translated. I have chosen a 12 point font size for main text and eight point for super- and subscripts. For the Courier fonts, which are fixed-pitch, a 12 point size corresponds to 'pica' pitch. Paged mode in *Interword* should be set to On to assist text layout, and the number of lines per page must be set at 66 (or 33 if double-line spacing is set). The return code, Ascii 13, induces new lines, while linefeeds, Ascii 10, are filtered out. It is preferable, though not essential, to suppress the sending of linefeeds to the spool



OLD BOTTLES

A PAGE OF TEXT TAKES JUST OVER A MINUTE TO SEND FROM A MASTER TO THE APPLE LASERWRITER PLUS

file, since the program runs marginally faster without them.

While on the subject of program speed, note that many Postscript programs redefine operators as single letters or very short letter sequences to reduce the number of characters which have to be transmitted. A rather complex procedure performs underlining, with positions and stroke widths based on data read from the Postscript font dictionaries. The backspace code, Epson printer code 8, is implemented. This is intercepted to produce a backspacing of one character width in the laser-printed output, useful for overstriking one character by another, or for placing accents. This generally works well with the Courier fonts, and often also with the proportional fonts, Times and Helvetica. However, with these latter fonts, there may be minor problems of character registration. (There are in fact better ways of producing accented characters in Postscript, but these involve font re-encoding, which is beyond the scope of this article). Multiple backspaces, or backspaces immediately followed by other control codes, cause an error.

Finally, there's a 'bonus' feature in the translator. This is a provision for absolute text positioning, a near-essential for work with proportional fonts. A given character – the vertical bar symbol, | – is placed in the text where the next character should be printed. There are two ways of doing this – either the | is typed as an ordinary character, in which case the *Interword* 'pad' character must be redefined as some other symbol, or the | is inserted as an embedded command, ie, via *Interword*'s embedded Command menu. The latter technique involves a few more keystrokes, but permits the Wysiwyg character of the screen display to be retained. In either case, when the | is read by the translator, it is interpreted as an absolute positioning symbol, causing the next character to be printed at the defined position on the current line. For setting out text in columns in Times or Helvetica, this feature is invaluable.

The running speed of the translator is limited by Basic's byte transfer operations. Even so, it is very respectable – a page of single-spaced text (about 500 words) on A4-size paper takes a little over one minute to send from a BBC Master to the Apple Laserwriter Plus.

For the longer article consisting of many pages of text, you may require a little patience, but the wait will be worthwhile!

Illustration by Caroline della Porta

DESIGN COUNSEL

Many design opportunities arise in schools. **CHRIS DRAGE** shows how the computer can further children's creativity

Many items of software include aspects of design which can be employed across the National Curriculum, helping to reinforce the principles underpinning the design process.

My intention this month is not to address computer-aided design (CAD) as such, but to look broadly at software which provides opportunities for children to practise general design and offer a 'computer solution'. Many of these programs may have been purchased for reasons other than their design element, although others are definitely design tools.

Mathematics is a natural place in which to find design-related software. ESM's excellent *Frieze* and award-winning *Kaleidoscope* (BBC B or Master) each promote design but at different levels, using the concepts of rotation, reflection and translation to create simple or complex patterns.

Children can explore designs through these three processes and create their own two-dimensional shapes for colourful wall displays. While *Kaleidoscope* can lead to the study of butterfly shapes, for example, *Frieze* enables pupils to produce complex and colourful frieze designs easily. Among the practical applications which await discovery are wallpaper designs and knitting patterns.

Among other maths software possessing a strong design flavour are: *Numerator* (Longman Logotron), *Craftshop 1* and *2* (4Mation Educational Resources) and the *Art Machine Pattern Book* (Topologika), all of which were described in *BAU* December 1990. The former program utilises a building-block approach in which mathematical function 'models' can be designed and tested. The latter programs lie at the very intersection of art, design and mathematics.

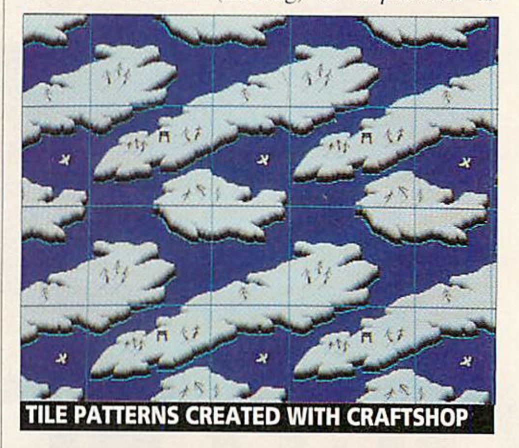
Craft Shop offers the ability to rotate, scale and reflect complex patterns made from simple shapes, do curve stitching in both two and three dimensions and tesselate patterns in one, two or four tiles. An embroidery program allows 'embroidered' designs to be created using patterns formed by combining stitches. The *Art Machine Pattern Book* encourages children to experiment with designs in weaving, pattern, bounce, tiling and tracks.

A computer-controlled robot turtle provides real experience within the school's Logo programme and can be used in design work in the primary classroom. One example I have used is a street plan of the local district with certain places and features added. The children were asked to design alternative bus routes for 'turtle buses'. Groups of children were responsible for routing their buses in the shortest and most economical manner. The turtle-simulator becomes a device to test the children's hypotheses, predictions and designs.

The Valiant Turtle, Pip or Roamer are ideally suited to the task as each is free from trailing leads and cables. The children might use them to design and plot nets to make buildings, etc, for their model of the local environment.

DTP OPTIONS

Desktop publishing software can fit into almost any area of the curriculum, offering so many design possibilities that it seems an essential tool. I don't propose to discuss every DTP program, but *Pixel Perfect* (AVP) is probably your best choice on eight-bit machines, while with the Archimedes the differentiation between DTP and wordprocessing is becoming increasingly blurred. Secondary schools will probably consider *Ovation* (Beebug) or *Impression 2/*



TILE PATTERNS CREATED WITH CRAFTSHOP



PIP CAN BE USED IN A DESIGN CONTEXT

Impression Junior (Computer Concepts) and *Poster* (4Mation Educational Resources), while the award-winning *Pendown* (Longman Logotron) and *Desktop Folio* (ESM) can be used at either primary or secondary level. *Phases 2* (Northwest Semerc) is probably best at the lower primary and special needs areas.

Although all of these programs are capable of producing stunning results, actually achieving these depends on the overall design of every document. To help in this respect, *DTP Seeds* (4Mation Educational Resources), written by Mike Matson is both a guide and an inspiration.

The affordable *FontFX* (Data Store) is ideally suited to designing logos and novel text styles for inclusion into DTP work, adding an interesting and imaginative aspect to page design. To assist in the design of pages several companies produce image libraries on discs, comprising drawfiles and clipart.

Midnight Graphics produces *Clip Art Set 1*, a range of images which includes borders, maps, food, people, arrows, shapes, animals, and so on. Over 480 images are available in the first compilation. The company's *Tracer* is another very handy utility for converting sprite images (from scanners, digitisers or art packages) into fully editable drawfiles. The translation can be in colour or monochrome, the results of which can be scaled, rotated and manipulated without loss of detail.

Another company specialising in publishing graphic libraries of interest to schools is Micro Studio. Its first compilation, in a series of topic packs is *World Geography Maps*, comprising over 100 maps of countries, all of which can be coloured and used in DTP documents. Such items not only save time, but can be a great aid in the page design process.

Forms Manager and *Fancy Labeller* (both Mewsoft) are two Risc OS multi-tasking programs which, by their very nature, lend themselves to use in a design context: *Forms Designer* combines large typefaces, standard-sized text, lines, boxes and grids to design forms up to A4 size. A school can output a set of very professional forms or worksheets or pupils engaged on a 'mini-enterprise' can produce appropriate forms for their 'company' to use.

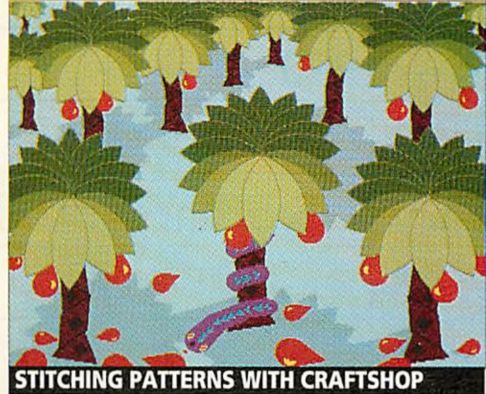
There are always times when labels are required in schools: bookplates, disc labels, drawers, cupboards, jars boxes, rewards, instructions, etc. *Fancy Labeller* combines different typefaces and very intricate frames to assemble and print very attractive labels. It also includes an option to design your own frames and fonts.

CONSTRUCTIVE DESIGN

Data Design has established a reputation for superb 'designer software'. *Designer Castles* and *Medieval Village* link computer, printer and human ingenuity in a novel manner.

Castles and villages can be designed and edited on-screen and the results printed as pieces (including the necessary glue tabs) ready for assembly into a 3D model with the help of scissors and glue. Designs may be saved to disc for further amendments later on. Indeed, a datafile of castles designs is available for downloading via Campus 2000.

Another program, *Designer Logic*, directly addresses the mathematics National Curriculum requirements for pupils to understand logic gates. The program permits a screen model to be made depicting the flow from an 'input' (for instance a temperature sensor) through a logic gate to an 'output' (a buzzer). Completed designs can be saved and printed out for work away from the computer. *Designer Environment* (for the BBC B/Master) is a very new program which permits children to create a modern environment, including a range of structures from telephone boxes to mosques.


STITCHING PATTERNS WITH CRAFTSHOP

In *BAU* February 91 I mentioned a unique design software tool called *Fads – Fashion Design and Figure Appreciation* (Advisory Unit, for the BBC B/Master). This is a program which accepts body measurements and draws a human figure on screen onto which different clothes may be 'placed' to assess the effect of fashion, line, proportion, pattern and colours.

Clothes and accessories can be designed and tried and the results can be printed on a range of printers, including an Integrex Colourjet. Computer art software has a place in improving, developing and extending design solutions. The possibility of producing an artistic impression from a design means that the reality in the designer's eye can be transferred more happily to both the producer of the finished article and its potential end user.

Suitable software for the BBC B/Master and Archimedes includes: *Picture Craft* (Longman Logotron), *Image* (Cambridge Micro Software), *Artisan 2* (Clares), an application with some features of use in textile design, and *Revelation* (Longman Logotron), a program capable of some very interesting image processing.

DESIGNER GAMES

At home, many computer simulation games offer a design element which, apart from adding variations to the game, provide a valuable exercise in design.

To illustrate this point, Superior Software's *Superior Golf* and *Construction Set* (for the Archimedes) provide opportunities for designing your own courses to play.

Another Superior program, the award winning *Sim City* (for the BBC B/Master), is based on the task of designing a city including houses, streets, factories, airports and power stations.

All of these programs can provide reluctant learners with design tasks they may willingly undertake. For recommended INSET/reading on the subject, try NCET's *Design – Words and Images* pack.

PRODUCT DETAILS

- Frieze and Kaleidoscope both cost £35. Contact ESM, Abbeygate House, East Road, Cambridge CB1 1DB.
- Forms Designer and Fancy Labeller both cost £27.90. Contact Mewsoft, 11 Cressy Road, London NW3 2NB.
- Clip Art Set 1 costs £29.95 and Tracer costs £52.13. Contact Midnight Graphics, 5 Victoria Lane, Whitefield, Manchester M25 6AL.
- DTP Seeds costs £8.45. Contact 4Mation Educational Resources, Linden Lea, Rock Park, Barnstaple, Devon EX32 9AQ.
- FontFX costs £9.95. Contact Datastore, 6 Chatterton Road, Bromley, Kent.
- World Geography Maps costs £29.95. Contact Micro Studio, 22 Churchgate Street, Soham, Cambridgeshire CB7 5DS.
- Artisan 2 costs £59.95. Contact Clares Micro Supplies, 98 Middlewich Road, Rudheath, Northwich, Cheshire CW9 7DA.
- Designer Castles, Medieval Village, Designer Logic and Designer Environment each cost £23.50. Printware support Rom for all four costs £28.75. Contact Data Design, Business Innovation Centre, Innovation Way, Barnsley S75 1JL.
- Fads costs £25. Contact AUCBE, Endymion Road, Hatfield, Hertfordshire AL10 8AU.

PUT SOME COLOUR BACK...

Results — 1990	January	February	March		
J Smith	75	70	55		
S Bowes	65	60	61		
A Williams	80	78	71		
S Watson	55	66	55		
R Wyatt	68	63	56		
AVERAGE	69	67	60	67	6
				Overall Average	6

SCHEMA
SPREAD SHEET PROGRAM

80
70
60
50
40
30
20
10
0

J Smith S Bowes A Williams S Watson R Wyatt

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Schema runs on all Archimedes and BBC A3000 computers with at least 1 Mb of memory and RISC OS.

Price £129.95 (Education £99.95)

Schema was produced in association with
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GENEALOGY

(See review in Feb '87 *and Aug. '89*)

FAMILY HISTORY SYSTEM The most popular program ever written for us. Enables you to produce a full family tree and many other genealogical listings. £19.95
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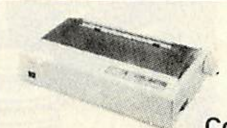
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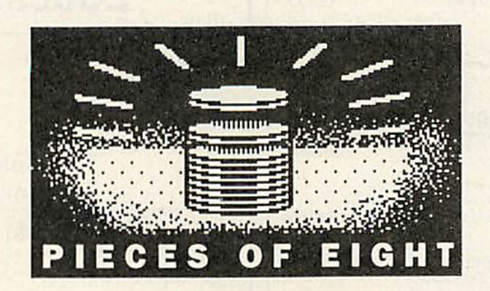
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WORD RE-VIEW

PAUL JAMES looks back at some programs designed to help View users make the most of their wordprocessing

Of all the wordprocessors for the Beeb, such as *Wordwise Plus* and *Interword*, only *View* seems to have had that 'addictive' quality. The pages of *BAU* have been filled with tips to enhance *View*, or fix known bugs in it, so this month we revisit a few of the best.

VIEW SPOOLER

Graham Bell, a former *BAU* editor, had his first program published in 1986. It was intended for use with the *View* family – ie, *View*, *Viewstore* and *Viewsheet*.

It acted as a printer driver, but instead of sending text to the printer, it was placed in a file which, with page formatting commands stripped, could then be read into other wordprocessors, databases or any other program that accepts Ascii text.

This is far more elegant than using *SPOOL <filename> to open an Ascii file, SCREENing the document then typing *SPOOL to close it.

Run the listing and it will save the machine code 'driver' as V.Ascii. Of course, ADFS users will have to create the directory $.V.

Now if you enter *View* and type PRINTER V.ASCII, the spooler will be loaded and issuing the PRINT command will, instead of passing the file to the printer, ask you for a filename to save the spooled text under. The *View* file will be spooled to this.

PRINTER DRIVER

View offers two highlight codes, for bold text and underlining. However, a printer driver can be added to take these characters, and any others after them, and translate them into other printer codes. There have been several *View* printer drivers – undoubtedly, the most comprehensive one was by Colin Ferrington (*BAU* November 1989). However, in October 1987, there was a far simpler printer driver, derived from an earlier one by *BAU* regular George Hill.

BAU's **Martin Phillips** found George's driver unnecessarily cumbersome, so he re-wrote it and came up with this very practical routine.

The main difference between the two was that Martin's program allowed meaningful names to be assigned to printer codes. For instance, the code for italics is, on many printers, 27, 52. Martin's program allowed you to add a comment for your reference, so this code could be called Italics. Fourteen such codes can be defined, the 15th being a printer reset.

The generator presents an editing screen which displays both the printer control codes and the comment. Drivers can be loaded, saved and printed out for reference.

To create a driver, all you need is the manual for your printer open at the printer control codes page. To enter the codes into the driver, first press E to edit – you will then be asked which letter to define. As an example, try entering an underline code: first, choose the character that can be used from within *View* to turn the effect on and off. Choose U and the generator will ask for the code which turns on underlining. The Epson-compatible code for underlining is 27,45,1 (the 27 is sent to the printer first so that it expects a control code, and doesn't print the following two codes as Ascii characters). If you have a non-Epson printer, simply replace this with the correct escape sequence. You will then be asked for the off code, so type 27,45,0.

```
        View Printer Driver Generator
             ON            OFF
@/P   27,64          0              Reset
A/Q   27,120,49      27,120,48      NLQ
B/R   27,114         27,116         Reverse
C/S   15             18             Compressed
D/T   27,69          27,70          Double
E/U   27,45,49       27,45,48       Underline
F/V   27,77          27,80          Font
G/W   27,87,49       27,87,48       Wide Print
H/X   27,104         27,117         Double Ht
I/Y   27,52          27,53          Italics
J/Z
K/[
L/\   27,83,0        27,84          Superscript
M/]   27,83,1        27,84          Subscript

    E..Edit          L..Load        S..Save
    £..Pound         Q..Quit        P..Print

Editing code K
Enter a number or press RETURN to end
Enter start code: ?27,
```

EDITING VIEW PRINTER DRIVER CODES

Finally, you will be asked for a comment, for your reference. This is displayed on the editing screen and, if you have made a mistake, simply re-edit it.

Continue adding codes until you have all you need and then save it to disc by pressing S. To use the driver from within *View* you first have to load it. Type PRINTER <filename>, where <filename> is the name you saved the driver under. You can build a directory of several drivers.

Enter the editing screen of *View* and at the top of your text add the command HT 2 141 (use SHIFT-F8 to insert the HT into the command strip). After this the new printer codes can be used within your text by first pressing SHIFT-F5 (highlight 2), followed by the letter assigned to that code, which you can look up with the handy wallchart that you printed out from the generator. So, to underline a section of text, include:

*UThis text is Underlined*U

where * is highlight 2. Remember that the effect command is like a switch – the first command turns highlighting on and the second turns it off. Martin states that an important function to include in your printer driver is a reset code, which should be present at the start of every document. He suggests that you use the special @ character for this purpose, as shown in the screenshot (left). To reset the printer this command should be used twice, ie, *@*@.

As a final tip, Martin suggests you always ensure that you turn an effect off, because if you don't the printer driver will get out of step and you may end up turning things off when you should really be turning them on!

SCREEN PREVIEWER

To round off this *View* special, here is another idea from **Graham Bell**.

We always strive to make our letters and other documents look good. Using a 24-pin printer, good paper and avoiding spelling errors all contribute towards a readable document. Also important is the layout, ie, how wide the margins are and how your text looks on the page.

Attention should be given to the 'shape' of the text. Graham lists the cause of a bad looking page – scrappy paragraphs, headings that merge with the text, lonely lines and widows (a single word on a line).

If you write many documents of the same type, it is useful to have a standard file, which already has in it the various page formatting commands. Adding your text to this and printing is a good way to ensure your letters have a consistent appearance.

However the text may still not look right when printed out. The solution is to preview the page(s) on screen before committing yourself to print. Graham's program does just this.

Type in the appropriate listing in the yellow pages which, when run, will generate the necessary code. GXR Rom owners can change the gxr variable at line 60 to TRUE and the program will take advantage of the extended plot commands to speed the whole process up.

Like Graham's spooler program, the code is saved in the V directory and is loaded as a printer driver, with the command PRINTER V.PAGE. Once loaded, the previewer will work in any graphics mode except mode 2, ie, 0, 1, 4, 5 or their shadow equivalents.

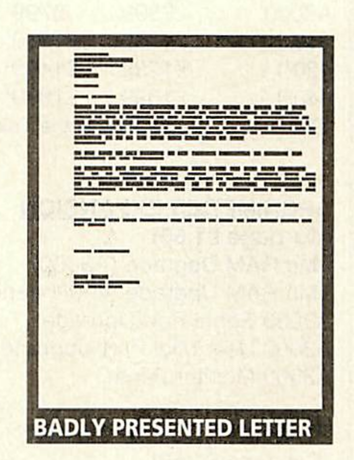
Now any document can be previewed by using either PRINT or SHEETS – either command waits for a keypress before drawing the next page. Graham points out that you may be using different paper sizes. The unaltered version is for A4-size paper using a pica font although *V.Page* can be altered for other sizes of paper and font sizes. To assemble a new version, changes can be made to the two constants, lines and chars. These denote the number of lines per page and the number of characters across.

As an example, the normal listing paper is 9.5 × 11in, which gives space for 85 pica characters across and 66 lines down. Take a look at the table (left) for other common paper sizes. The maximum size *V.Page* can manage is 82 lines of 160 characters; if the paper is too big, then only the central part is shown on screen.

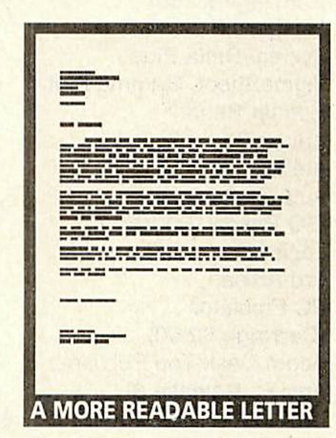
When assembling a new version insert the new dimensions at line 70 and 80 and change the file name at line 90. Graham suggests that you incorporate the page size into the filename, ie, *V.PA9x11E*. The *V.Page* driver will also work with any member of the *View* family that accepts normal printer drivers.

If you have any questions about *View* then please send them in, marking your envelope *View* Special. We will publish selected answers at a later date.

Paper Size	Lines	Width in chars pica	elite
9.5x11	66	85	102
14.5x11	66	135	162
A5 (portrait)	50	59	70
A5 (landscape)	35	82	99
A4 (portrait)	70	82	99
A4 (landscape)	49.5	117	140
A3 (portrait)	99	117	140
A3 (landscape)	70	165	198



BADLY PRESENTED LETTER



A MORE READABLE LETTER

```
CO Style file for memo
PL 50
TM 4
BM 4
HM 4
FM 4
LM 15
LS 0
DH ////
DF ////
CE Memo
LJ From    : Ron Sadler
LJ To      :
LJ Ref     :
LJ Date    :
LJ Subject:
CO Room for 20 lines of text
```

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SOFT KEY SHUFFLE

If you are a BBC Master or Compact user frustrated at losing soft keys after a hard break, **DAVID HOLTON** has written this useful utility to help solve your problems

Have you ever been annoyed by the lack of a simple star command on the Beeb to show all the soft key strings at one go? It can be infuriating. You can use *SHOW <number> for one key, but not the lot.

Equally frustrating can be losing all the soft key settings after CTRL-BREAK – for example, when you're writing a sideways Rom and need a hard break to initialise it. The Basic can be recovered by OLD, but your soft key settings are gone and you have to use the disc drive to load them in again.

If you have ever felt the need for more than 10 soft keys at a time, then you have probably been crying out for a utility to solve these problems.

Hence *Softie,* a sideways Rom utility written for the BBC Master and Compact.

USING COMMANDS

Three simple star commands are provided:

- *SK (show keys) displays all the soft key settings at one go
- *FK (flip keys) brings in a second bank of soft key settings
- *WK (wipe keys) erases the foreground bank of soft key settings

Type in listing 1 and save it to a disc. It puts *Softie* into SRam slot 7, but you can change that if you wish (the last figure on the last line). Unfortunately, you then have to use CTRL-BREAK to initialise it, because it intercepts a vector. If you now insert, say, a disc with a boot file which sets up your soft keys, you can write *FK after the first 10 settings, then set up another 10. From then on, typing *FK will 'flip' from one bank of soft key settings to the other, showing you which bank you have selected.

The Master stores the soft key strings differently from earlier Beebs, using the first 1K of a 4K chunk of memory known as ANDY – which is, in effect, another sideways Ram slot. The first 34 bytes contain the start addresses of the soft key strings; first low bytes, then high.

On hard break, the MOS resets all these start-addresses, leaving the actual strings untouched. To protect the key settings, all you need to do is keep a copy of these first 34 bytes and copy them back after a hard break. ANDY is controlled via ROMSEL, an address in main memory at &FE30, which also controls the 16 sideways Roms. Bits 0-2 of ROMSEL select the sideways Roms, and bit 7, when set, pages in ANDY instead of the first 4K of the currently selected Rom, leaving its last 12K operative.

Provided the relevant code in a sideways Rom is located after &8FFF, it can page in ANDY, tinker with the soft key pointers and page ANDY out again. The header code P% is reset to &9000, so all the important code comes after this point.

SAFE KEEPING

Where can you keep the 34 bytes completely safe? Well, there is spare capacity in the SRam slot after the code of *Softie*. It's an ideal place, except that a sideways program using workspace within its own slot only runs in Ram as a 'Rom image', and cannot be blown into an Eprom.

On initialisation, the vector CLIV is redirected through *Softie* and all star commands are examined. If they begin with *K, the pointers in ANDY are copied into *Softie*'s SRam at the variable 'store'. Thus the copy is always updated after any *KEY command. On receiving call &24, issued after a hard break, *Softie* pages in ANDY and copies them back again.

If you are committed to using SRam for storage, there is ample room to store another batch of soft key settings, so you can flip between what I term the 'foreground' and 'background' banks, copying the previous background bank into SRam. The copy of the pointers at 'store' is then updated to protect the new foreground bank against a hard break. For Eproms, listing 2 modifies the code to split the soft key buffer in half, using half for each bank.

*SK is simply implemented by pointing XY at a string SHOW 0 in SRam and calling OSCLI. The key number is then incremented and OSCLI called again, 10 times round a loop. This is the biggest headache for the Eprom version – listing 2 copies the string out into the CLI buffer so that the key number can be changed.

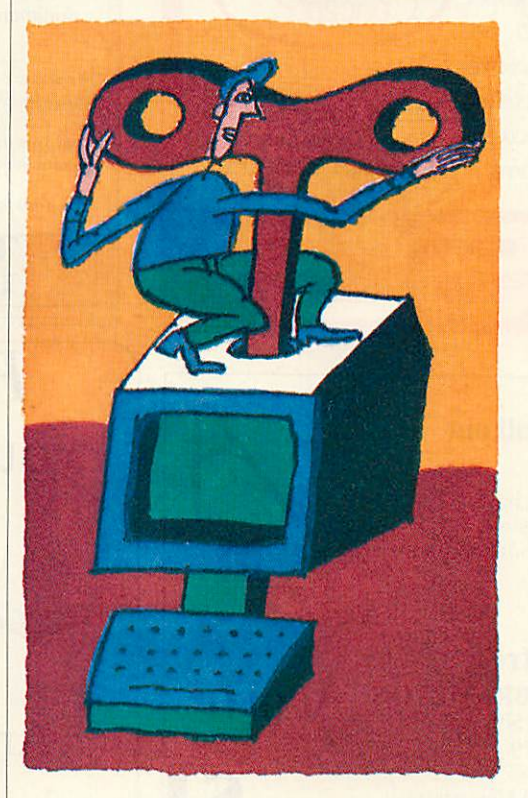


Illustration by Benoit Jacques



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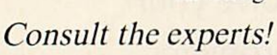
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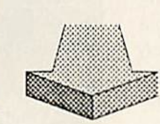
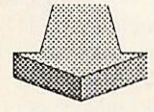
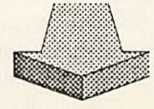
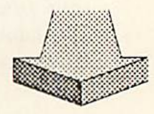


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Program	Page	BBC B	B+/128	Master	Master Compact	Electron	Arc	6502SP Turbo	ADFS	Econet	Shadow Ram	Monthly Disc
Music	19	Ample Listing										
RiscRevue	30						■					
EightBits	65											
Listing 1		■	■	■	■			■	■	■	■	■
Listing 2 - 5		■	■	■	■	■		■	■	■	■	■
Core War	71											
Listing 1		■	■	■	■		■	■	■	■	■	■
Listing 2		■	■	■	■			■	■	■	■	■
Listing 3							■					■
Piclist	80						■					■
Font Designer (1)												
New Wine	86	■	■	■	■		■	■	■	■	■	■
Pieces of 8	92	■	■	■	■	■		■	■	■	■	■
Softie	95			■								■

Note 1. The font designer is not listed on the yellow pages due to its length. To obtain the May monthly disc, which includes the font designer and all of the programs listed here, phone our mail order house to place a credit card order on (0937) 842489, or send a cheque/PO made payable to Redwood Publishing for £4.95 (5.25in), £5.95 (3.5in), marking your envelope May Monthly Disc. Turn to page 29 for details of how to get the monthly disc **free** with each issue.

Music

Listing 1

```
"RUN" []  "dv" []   "dvib" [] "l" []
"logo" [] "mel" []  "mem" []  "mix" []
"mix1" [] "mix2" [] "p" []    "pla1" []
"pla2" [] "pla3" [] "p1b1" [] "p1b2" []
"p1b3" [] "p1i1" [] "p1i2" [] "p1i3" []
"p1i4" [] "p1i5" [] "p2" []   "p3" []
"sus" []  "sus6" [] "t" []    "ting" []
 "st" []  "vib" []  "solo" [] "solo1" []
"part1a" []   "part1b" []  "part1i" []
"part2a" [    "play" []    "pos" []

"RUN" [7MODE"QUIT"$+
DISPLAY
%
logo
play
]

"dv" [Delvib
]

"dvib" [Deepvib
]
"l" [64=L
]
"logo" ["Spanish Mood..."$OUT NL
"       composed and arranged by"$OUT NL
"       John Bartlett (c) 1990"$OUT NLNL
"A track from the album 'Guitars'"$OUTNL
"from JB Software,"$OUT NL
"     20 Crawley Avenue,"$OUT NL
"     Wellingborough,"$OUT NL
"     Northants,"$OUT NL
"     NN8 3YH."$OUT NL NL
"Price : £3.95 inc P&P"$OUT
]
"mel" [2 CHANS
    1 CHAN
     Round   Delvib   Long
      1 POS
    2 CHAN
     Broad    Delvib   Verylong
       40 OFFSET   98 AMP
    EVERY CHAN
]
"mem" [GVAR
]

"mix" [M5MIX 48,90=T
1 SHARE 6 VOICES solo
 1 VOICE 128 VOL 0 PAN
 2 VOICE 128 VOL 0 PAN
 3 VOICE 128 VOL 0 PAN
 4 VOICE 128 VOL 0 PAN
 5 VOICE 128 VOL 0 PAN
 6 VOICE 128 VOL 0 PAN
PNUM SHARE
]

"mix1" [1SHARE6VOICESUNUSED
1 SHARE 4 VOICES solo
 1 VOICE 128 VOL 0 PAN
 2 VOICE 128 VOL 0 PAN
 3 VOICE 128 VOL 0 PAN
 4 VOICE 128 VOL 0 PAN
2 SHARE 2 VOICES mel
 1 VOICE 128 VOL 0 PAN
 2 VOICE 110 VOL 0 PAN
PNUM SHARE
]

"mix2" [1 SHARE 4 VOICES UNUSED
2 SHARE 2 VOICES UNUSED
PNUM SHARE
1SHARE6VOICESsolo
]

"p" [45=L
]

"pla1" [%STAFF
SCORE48,3BAR p2ONsus
20 3+L
6,^0:AAA^AAA^AAA^AAA^AAA^AAA
20 3-L
6,^0:AAA^AAA^AAA^AAA~B~CCC~+C~DDD
1:6,DDDD^bbb^CCC^DDD+DEEE^EEE
]

"pla2" [%STAFF
SCORE48,3BARONsus p
6,^1:EEE^FFF^eee^GGG^GGG^eee
6,^1:DDD^EEE^ddd^FFF^FFF^ddd
6,^1:CCC^DDD^ccc^EEE^EEE^ccc
]

"pla3" [%STAFF
SCORE48,3BAR
0:8,BCb12,ag'!e(3,+GBE)///////
]

"p1b1" [%STAFF
SCOREK(+F+C+G+D)K48,4BAR
mix2 t
ONsus6-12@64 12+Tp'-1:24,E!E(GBE)'
-1:24,=F(^^^)E(GBE)'b(^^^)E(GBE)'
-1:24,A(^^^)E(GBE)
'-1:24,E(^^^)!E(GBE)'=f(^^^)E(GBE)'
-1:24,B(^^^)E(GBE)'a(^^^)E(GBE)
'-1:24,E(^^^)!E(GBE)'=f(^^^)E(GBE)'
-1:24,B(^^^)E(GBE)'a(^^^)E(GBE)
]

"p1b2" [%STAFF
SCOREK(+F+C+G+D)K48,4BAR
ONsus6-12@p 19'L
4FOR(
-1:12,'E(1,BEGBE)E(-1,BEGBE)
)FOR 0,^(^^^^^)OFFsus6
]

"p1b3" [%STAFF
SCOREK(+F+C+G+D)K48,4BAR
-12@vib1:12,E///dv^/ p1b2 vib
1:12,G///dv ^^ p1b2 vib1:12,B///dv^
p1b2 vib 2:12,=C///dv ^1 0@
-2:12,E(2,!EBEGE)///////tE(^^^^^)p
-2:12,~GB'EGB'E~GB'E/12@!eGBE^//
1VOICE ting 100VOL 2VOICE Drum 50VOL
2 2Echo
-1:E///
0:48,BE
EVERY VOICEsolo
]

"p1i1" [%STAFF
SCOREK(+F+C+G+D)Kp
-2:12,G/'G(4,BEGBE)///G(1,BEGBE)
-2:12,G(-1,BEGBE)G(4,BEGBE)///'
-1:4,E(^^^^^)/+E/A/'B/=C/D/'=F/~G/
0:4,~=F/6,e/=d/bge=dcbg///
-2:12,'G(3,BEGBE)///G(1,BEGBE)
G(-1,BEGBE)-2:48,G(3,BEGBE)
]

"p1i2" [%STAFF
SCOREK(+F+C+G+D)Kp'
-2:48,E
-2:12,B(2,EGB)///~+B(~+E~A~B)/////
-1:8,G(^^^)AB=C'b~=C~b12,a8,gA'B=C'
-1:4,B/~=C/~b/6,a/'dvib=f///////
dvp2-1:6,G~=f~e~d~c~=cpb///'
-2:24,B(3,EGB)
]

"p1i3" [%STAFF
SCOREp'
-2:6,E///F/G/4,B/D/E/'6,dEF'dvib
-1:6,E///dvF/~e~d~c~b4,e/F/G/B/D/E/
-1:8,FGA12,B/8,eFGABCdvib24,Ddv
24=L 30 9+L 32 9+T          st
8,!e(!E)~e(!E)
-2:8,~E(!!E)'E(+!!G)~E(+!!G)
-2:8,~E(+!!G)'E(!!B)~E(!!B)~E(!!B)
]

"p1i4" [%STAFF
SCORE 44=L
-2:8,E(!!D)~E(!!D)~E(!!D) 1
-2:24,E(1,!EBE+GE)^(^^^^^)E(1,!EBE+GE)
24,^(^^^^^)-2:E(3,!EBE+GE)///
0,^(^^^^^)
]

"p1i5" [%STAFF
SCOREp st 30 0-T
-1:6,'E(+GBE)///^(^^^)/4,B/C/D/E/F/
0:4,G/6,f~G~fe/!!e(!!G)/~e(!!F)/
-2:6,~E(!!E)/4,E(!!B)/~E(!!A)/
-2:4,~E(!!G)/6,E(!!D)~E(!!C)~E(!!B)
dvib0:6,E(^)///////dv'!e(!!G)/
-2:6,~E(!!F)/~E(!!E)/'4,E(!!B)/
-2:4,~E(!!A)/~E(!!G)/'6,E(!!D)
-2:6,~E(!!C)~E(!!B)  1
-2:24,E(2,!EBE+GE)//E(1,!EBE+GE)
0,^(^^^^^) 48,^^
]

"p2" [30=L
]

"p3" [20=L
]

"part1a" [p1a1 p1a2 p1a3
]

"part1b" [p1b1 p1b2 p1b3
]

"part1i" [p1i1 p1i2 p1i2 p1i3 p1i4 p1i5
]

"part2a" [%STAFF
mix1
SCORE48,3BAR-12@ 3 2Echo p2
-1:24,A!ACEca !aACEEA edcDEA
0:24,BEGebE fADafA EdcDEc OFFEcho 1
48,^-2:E(!E)/
]

"play" ["12-iab"PLAY
]


"pos" [GVAR
]

"solo" [2 CHANS
1 CHAN
               98 AMP
 Bright       Flat         Long
  ON RM
2 CHAN
    0 SHIFT   120 OFFSET 128 AMP
 Round        Delvib       Long
EVERY CHAN
  ON PHSET
]
"solo1" [2 CHANS
1 CHAN
               98 AMP
 Bright       Flat         Long
  ON RM
2 CHAN
    0 SHIFT   120 OFFSET 128 AMP
 Round        Delvib       Long
EVERY CHAN
  ON PHSET
]
"st" [-2Len
]

"sus" [ACT(5FVAR#?  IF(1 mem#+!
4 mem#?#< IF(1 mem#!)IF
mem#?VOICE!)IF FRAME
ACT)ACT
]
"sus6" [ACT(5FVAR#?  IF(1 mem#+!
6 mem#?#< IF(1 mem#!)IF
mem#?VOICE!)IF FRAME
ACT)ACT
]

"t" [48,90=T
]

"ting" [2 CHANS
  ON CHANS
1 CHAN
               -2 POS
2 CHAN
                2 POS
   200 OFFSET 128 AMP
EVERY CHAN
 Round        Delvib       Long
  ON PHSET
]
"vib" [Vibrato
]
```



Risc Revue

Listing 1

```
10 REM >SolidGraph (RR1)
20 REM Plot lit 3-D Graph
30 REM by James Gallagher
40 REM for Archimedes only
50 REM (c) BAU May 1991
60 :
70 MODE 12
80 PROCinitialise
90 surface%=cyan
100 background%=blue
110 dark%=2
120 view_from()=12,6,8
130 view_to()=0,-.5,0
140 zoom=1700
150 light_from()=1,1,3
160 light_to()=0,0,0
170 xpoints%=60
180 ypoints%=60
190 xmin=-4
200 xmax=4
210 ymin=-4
220 ymax=4
230 PROCset_up_scene
240 PROCplot_function
250 PRINT "Function plotted in ";TIME/100;" seconds"'
260 ON
270 END
280 :
290 DEF PROCplot_function
300 p%=0
310 CASE quadrant% OF
320 WHEN 1:
330 FOR i%=0 TO xp%
340 PROCpercent(i%,xp%)
350 x=xmin+xstep*i%
360 FOR j%=0 TO yp%
370 y=ymin+ystep*j%
380 PROCimage_point
390 p%+=1
400 NEXT
410 NEXT
420 WHEN 2:
430 FOR j%=0 TO yp%
440 PROCpercent(j%,yp%)
450 y=ymax-ystep*j%
460 FOR i%=0 TO xp%
470 x=xmin+xstep*i%
480 PROCimage_point
490 p%+=1
500 NEXT
510 NEXT
520 WHEN 3:
530 FOR i%=0 TO xp%
540 PROCpercent(i%,xp%)
550 x=xmax-xstep*i%
560 FOR j%=0 TO yp%
570 y=ymax-ystep*j%
580 PROCimage_point
590 p%+=1
600 NEXT
610 NEXT
620 WHEN 4
630 FOR j%=0 TO yp%
640 PROCpercent(j%,yp%)
650 y=ymin+ystep*j%
660 FOR i%=0 TO xp%
670 x=xmax-xstep*i%
680 PROCimage_point
690 p%+=1
700 NEXT
710 NEXT
720 ENDCASE
730 CLS
740 IF quadrant%=2 OR quadrant%=4 SWAP xp%,yp%:SWAP xpoints%,ypoints%
750 p%=0
760 FOR i%=0 TO xp%
770 FOR j%=0 TO yp%
780 q%=p%+ypoints%
790 IF i%<>xp% AND j%<>yp% THEN
800 PROCshade
810 MOVE plot%(0,p%),plot%(1,p%)
820 MOVE plot%(0,q%),plot%(1,q%)
830 PLOT &55,plot%(0,p%+1),plot%(1,p%+1)
840 PLOT &55,plot%(0,q%+1),plot%(1,q%+1)
850 ENDIF
860 p%+=1
870 NEXT
880 NEXT
890 ENDPROC
900 :
910 DEF PROCshade
920 vec1()=(f(0,p%+1)-f(0,p%)),f(1,p%+1)-f(1,p%),f(2,p%+1)-f(2,p%)
930 vec2()=(f(0,q%)-f(0,p%)),f(1,q%)-f(1,p%),f(2,q%)-f(2,p%)
940 IF SGN light_vec(2)=1 SWAP vec1(),vec2()
950 n()=(vec1(1)*vec2(2)-vec1(2)*vec2(1)),vec1(2)*vec2(0)-vec1(0)*vec2(2),vec1(0)*vec2(1)-vec1(1)*vec2(0)
960 n()=n()*light_vec()
970 shade%=bright*SUMn()/(MODvec1()*MODvec2())
980 IF shade%<0 shade%=0
990 IF shade%=bright shade%-=1
1000 GCOL shade%+dark%
1010 ENDPROC
1020 :
1030 DEF PROCimage_point
1040 obj_pos()=x,y,FNz
1050 f(0,p%)=x
1060 f(1,p%)=y
1070 f(2,p%)=obj_pos(2)
1080 rel_obj_pos()=obj_pos()-view_from()
1090 rel_obj_pos()=rotate().rel_obj_pos()
1100 scale=-zoom/rel_obj_pos(0)
1110 plot%(0,p%)=scale*rel_obj_pos(1)
1120 plot%(1,p%)=scale*rel_obj_pos(2)
1130 ENDPROC
1140 :
1150 DEF PROCpercent(a,b)
1160 PRINT TAB(51,10);STR$INT(100*a/b);"%"
1170 ENDPROC
1180 :
1190 DEF PROCset_up_scene
1200 xp%=xpoints%-1
1210 yp%=ypoints%-1
1220 xstep=(xmax-xmin)/xp%:ystep=(ymax-ymin)/yp%
1230 DIM plot%(1,xpoints%*ypoints%-1)
1240 DIM f(2,xpoints%*ypoints%-1)
1250 COLOUR 0,background%
1260 COLOUR 128
1270 CLS
1280 b%=background%
1290 bright=16-dark%
1300 VDU 19;24,255 AND((b% AND 1)=1),255 AND ((b% AND 2)=2),255 AND ((b% AND 4)=4)
1310 COLOUR 1,background% EOR 7
1320 r%=16*(surface%AND1)
1330 g%=8*(surface%AND2)
1340 b%=4*(surface%AND4)
1350 FOR c%=2 TO 15
1360 COLOUR c%,c%*r%,c%*g%,c%*b%
1370 NEXT
1380 view_vec()=view_to()-view_from()
1390 light_vec()=light_to()-light_from()
1400 light_vec()=light_vec()/MOD light_vec()
1410 IF ABS view_vec(0)<small view_vec(0)=small*SGN view_vec(0):IF view_vec(0)=0 view_vec(0)=small
1420 yrot=-ATN(view_vec(2)/view_vec(0))
1430 zrot=-ATN(view_vec(1)/SQR(view_vec(0)*view_vec(0)+view_vec(2)*view_vec(2)))
1440 IF SGN view_vec(0)=1 zrot=PI-zrot
1450 xrot=ATN(TAN yrot*SIN zrot)
1460 cx=COS xrot:cy=COS yrot:cz=COS zrot
1470 sx=SIN xrot:sy=SIN yrot:sz=SIN zrot
1480 rotate()=(cy*cz),sz,-sy*cz,-(cx*cy*sz+sx*sy),cx*cz,cx*sy*sz-sx*cy,cx*sy-sx*cy*sz,sx*cz,sx*sy*sz+cx*cy
1490 obj_pos()=1,2,0
1500 obj_pos()=rotate().obj_pos()
1510 IF obj_pos(0)>0 quadrant%=1:IF obj_pos(1)<0 quadrant%=4
1520 IF obj_pos(0)<=0 quadrant%=2:IF obj_pos(1)<=0 quadrant%=3
1530 COLOUR 1:PRINT TAB(20,10);"Calculating data for graph..."
1540 ENDPROC
1550 :
1560 DEF PROCinitialise
1570 DIM vec1(2), vec2(2)
1580 DIM light_from(2),light_to(2),light_vec(2),n(2)
1590 DIM view_vec(2),view_from(2),view_to(2)
1600 DIM rotate(2,2),obj_pos(2),rel_obj_pos(2)
1610 black=0:red=1:green=2:yellow=3
1620 blue=4:magenta=5:cyan=6:white=7
1630 small=.01
1640 ORIGIN 640,512
1650 OFF
1660 TIME=0
1670 ENDPROC
1680 :
1690 DEF FNz
1700 r=x*x+y*y
1710 =COS(2.5*SQRr)
```

Listing 2

```
10 REM >Align (RR2)
20 REM Demonstrate use of ALIGN'ed code
30 REM by Dave Acton
40 REM for Archimedes only
50 REM (c) BAU May 1991
60 :
70 MODE 13
80 OFF
90 DIM code% &100,time%(3)
100 FOR align%=0 TO 3
110 FOR pass%=0 TO 2 STEP 2
120 P%=code%
130 [OPT pass%
140 :
150 .test
160 MOV R3,#32
170 :
180 .loop1
190 MOV R2,#80*1024
200 MOV R1,#&10000
210 FNalign(align%)
220 :
230 .loop2
240 LDR R4,[R1],#4
250 SUBS R2,R2,#4
260 BNE loop2
270 SUBS R3,R3,#1
280 BNE loop1
290 MOV R15,R14
300 ]
310 NEXT pass%
320 PRINT"Timing alignment ";align%
330 TIME=0
340 CALL test
350 time%(align%)=TIME
360 NEXT align%
370 PRINT''"Results:"'
380 FOR align%=0 TO 3
390 PRINT"Alignment ";align%;" : ";time%(align%)/100;" sec"
400 NEXT
410 END
420 :
430 DEF FNalign(word%)
440 WHILE ((P% DIV 4) AND 3)<>word%
450 [OPT pass%
460 MOVNV R0,R0
470 ]
480 ENDWHILE
490 =0
```

Listing 3

```
10 REM >Field (RR3)
20 REM Scrolling star field MKII
30 REM by Dave Lawrence
40 REM for Archimedes only
50 REM (c) BAU May 1991
60 :
70 MODE 13
80 OFF
90 stars=64
100 xsize=320<<20
110 ysize=256<<20
120 DIM code 4000,stardat% stars*4*4,sintab% 360*4,costab% 360*4
130 PROCcode
140 PROCstars
150 MOUSE RECTANGLE -359*2,-255*2,359*4,255*4
160 MOUSE TO 0,0
170 CALL starfield
180 END
190 :
200 DEF PROCstars
210 dat=stardat%
220 FOR i%=1 TO stars
230 dat!0=RND(360)-1              :REM angle
240 dat!4=(RND(1)*128)*(1<<8) :REM distance
250 dat!8=(RND(1)*10)<<6          :REM speed
260 dat!12=!screen%+320           :REM old screen
270 dat+=16
280 NEXT
290 ENDPROC
300 :
310 DEF PROCcode
320 angle=1
330 dist=2
340 speed=3
350 poke=4
360 xpos=5
370 ypos=6
380 rnd_seed=5
390 rnd_xor=6
400 spin=7
410 theta=8
420 accel=9
430 count=11
440 data=12
450 sp=13
460 link=14
470 pc=15
480 FOR pass=0 TO 2 STEP 2
490 P%=code
500 [OPT pass
510 .starfield
520 STMFD (sp)!,{link}
530 MOV spin,#0
540 MOV accel,#10
550 :
560 .main
570 SWI "OS_Mouse"
580 MOV R0,R0,LSL #16
590 ADDS spin,spin,R0,ASR #19
600 ADDMI spin,spin,#360
610 CMP spin,#360
620 SUBGE spin,spin,#360
630 MOV R0,R1,LSL #16
640 ADDS accel,accel,R0,ASR #18
650 MOVMI accel,#0
660 MOV R0,#21
670 ADR R1,setmouse
680 SWI "OS_Word"
690 MOV R0,#19
700 SWI "OS_Byte"
710 MOV count,#stars
720 LDR data,stardat
730 :
740 .starloop
750 LDMIA data,{angle,dist,speed,poke}
760 MOV R0,#0
770 STRB R0,[poke]
780 :
790 .moveon
800 ADD theta,angle,spin
810 CMP theta,#360
820 SUBGE theta,theta,#360
830 LDR R0,sintab
840 LDR R0,[R0,theta,ASL #2]
850 MUL R0,dist,R0
860 ADD xpos,R0,#(xsize/2)
870 LDR R0,costab
880 LDR R0,[R0,theta,ASL #2]
890 MUL R0,dist,R0
900 ADD ypos,R0,#(ysize/2)
910 CMP xpos,#xsize
920 CMPCC ypos,#ysize
930 BCC noreset
940 BL rnd
950 ADD R0,R0,#20
960 MOV dist,R0,ASL #6
970 BL rnd
980 MOV speed,R0,ASL #1
990 :
1000 .newangle
1010 BL rnd
1020 MOV angle,R0,ASL #1
1030 CMP angle,#360
1040 BGT newangle
1050 B moveon
1060 :
1070 .noreset
1080 LDR poke,screen%
1090 MOV R0,ypos,ASR #20
1100 ADD poke,poke,R0,ASL #6
1110 ADD poke,poke,R0,ASL #8
1120 MOV R0,dist,LSR #11
1130 CMP R0,#16
1140 MOVGE R0,#15
1150 ADR ypos,colours
1160 LDRB R0,[ypos,R0]
1170 STRB R0,[poke,xpos,ASR #20]!
1180 ADD dist,dist,speed
1190 ADD speed,speed,accel
1200 STMIA (data)!,{angle,dist,speed,poke}
1210 SUBS count,count,#1
1220 BNE starloop
1230 SWI "OS_ReadEscapeState"
1240 BCC main
1250 LDMFD (sp)!,{pc}
1260 :
1270 .rnd
1280 LDR rnd_seed,seed
1290 LDR rnd_xor,xor
1300 MOV R0,#0
1310 ]
1320 FOR bit=1 TO 8
1330 [OPT pass
1340 MOVS rnd_seed,rnd_seed,LSL #1
1350 EORCS rnd_seed,rnd_seed,rnd_xor
1360 ADC R0,R0,R0
1370 ]
1380 NEXT bit
1390 [OPT pass
1400 STR rnd_seed,seed
1410 MOV pc,link
1420 :
1430 .seed
1440 EQUD TIME
1450 .xor
1460 EQUD &1D872B41
1470 :
1480 .setmouse
1490 EQUB 3
1500 EQUD 0
1510 ALIGN
1520 :
1530 .screen%
1540 EQUD 148
1550 EQUD -1
1560 :
1570 .stardat
1580 EQUD stardat%
1590 :
1600 .sintab
1610 EQUD sintab%
1620 :
```

Continued ▶

◀ Continued

```
1630 .costab
1640 EQUD costab%
1650 :
1660 .colours
1670 EQUD &03020100
1680 EQUD &2F2E2D2C
1690 EQUD &D3D2D1D0
1700 EQUD &FFFEFDFC
1710 ]
1720 NEXT
1730 SYS "OS_ReadVduVariables",screen%,screen%
1740 FOR i%=0 TO 359
1750 !(sintab%+i%*4)=SINRAD(i%)*(1<<12)
1760 !(costab%+i%*4)=COSRAD(i%)*(1<<12)
1770 NEXT
1780 ENDPROC
```

Listing 4

```
10 REM >TimerTest (RR4)
20 REM by Dave Acton
30 REM for Archimedes only
40 REM (c) BAU May 1991
50 :
60 DIM code% &100
70 ioc_soft_control=&106
80 ioc=&3200000
90 t1_low=&50
100 t1_high=&54
110 t1_go=&58
120 t1_latch_command=&5C
130 link=14
140 pc=15
150 :
160 FOR pass%=0 TO 2 STEP 2
170 P%=code%
180 [OPT pass%
190 :
200 .test
210 MOV R9,link
220 SWI "XOS_EnterOS"
230 MOV R1,#ioc
240 MOV R8,#2000
250 :
260 .loop
270 MOV R0,#1000 MOD 256
280 STRB R0,[R1,#t1_low]
290 MOV R0,#1000 DIV 256
300 STRB R0,[R1,#t1_high]
310 STRB R0,[R1,#t1_go] \ set timer going
320 :
330 .waitforchange
340 STRB R0,[R1,#t1_latch_command]
350 LDRB R0,[R1,#t1_high]
360 CMP R0,#0
370 BGT waitforchange
380 LDRB R0,[R1,#t1_low]
390 CMP R0,#10
400 BGE waitforchange
410 SUBS R8,R8,#1
420 BNE loop
430 TEQP R9,#0
440 MOVNV R0,R0
450 MOVS pc,link
460 ]
470 NEXT pass%
480 TIME=0
490 CALL test
500 PRINT TIME/100
510 END
```

Listing 5

```
10 MODE0:ORIGIN640,512:DIMX(9),Y(9),Z(9):s=1:t=2:FORP=1TO9:X(P)=RND(999)-500:Y(P)=RND(999)-500:Z(P)=RND(999)-500:NEXT:REPEAT:P+=2:C=COSRADP:S=SINRADP:SYS6,113,s:SYS6,112,t:SWAPs,t:WAIT:CLS:FORK=1TO9:X=X(K)*C-Y(K)*S:Y=X(K)*S+Y(K)*C:Z=Z(K):B=Y*C-Z*S:D=Y*S+Z*C:A=X*C+D*S:DRAWA,B:CIRCLEFILLA,B,20:NEXT:UNTIL0
```

Listing 6

```
10 MODE0:MOUSEON:DIMx(8),y(8):s=1:t=2:REPEAT:MOUSEx(1),y(1),b:SYS6,113,s:SYS6,112,t:SWAPs,t:WAIT:CLS:CIRCLEx(1),y(1),40:FORi=2TO8:x=x(i-1)-x(i):y=y(i-1)-y(i):d=SQR(x^2+y^2):p=(d-80)/d:x(i)+=x*p:y(i)+=y*p:CIRCLEx(i),y(i),40:LINEx(i-1),y(i-1),x(i),y(i):NEXT:UNTIL0
```

Eight Bits

Listing 1

```
10 REM BatchBas (EB1)
20 REM Batch Processor
30 REM by M Lewis
40 REM additions by A C Rowland
50 REM for B/B+/E/M/C
60 REM (c) BAU May 1991
70 :
80 osargs=&FFDA
90 oscli=&FFF7
100 osword=&FFF1
110 osasci=&FFE3
120 nvwrch=&FFCB
130 osgbpb=&FFD1
140 store=&80
150 buffer=&C00
160 FOR pass=0 TO 3 STEP 3
170 P%=&900
180 PROCpass
190 NEXT pass
200 a$="SAVE BATCH "+STR$~batch+" "+STR$~(P%)+" "+STR$~batch
210 PRINT a$
220 OSCLI a$
230 END
240 DEF PROCpass
250 [OPT pass
260 :
270 .batch
280 LDX #store
290 LDY #0
300 LDA #1
310 JSR osargs
320 LDY #0
330 JSR copy
340 LDY #0
350 LDX #0
360 JSR setvars1
370 LDY #0
380 JSR doexec
390 LDX #exec_text MOD256
400 LDY #exec_text DIV256
410 JSR oscli
420 OPT FNcopypair(&216,oldvect)
430 OPT FNsetvector(readchr,&216)
440 OPT FNcopypair(&20E,oldWRCHV)
450 RTS
460 :
470 .reset
480 OPT FNcopypair(oldvect,&216)
490 OPT FNcopypair(oldWRCHV,&20E)
500 LDY handle
510 LDX temp
520 SEC
530 RTS
540 :
550 .copy
560 LDX #0
570 :
580 .copy1
590 LDA (store),Y
600 STA buffer,X
610 INX
620 INY
630 CMP #13
640 BNE copy1
650 RTS
660 :
670 .setvars
680 TYA
690 CLC
700 ADC #buffer MOD256
710 STA vars,X
720 INX
730 LDA #buffer DIV256
740 ADC #0
750 STA vars,X
760 INX
770 :
780 .setvars1
790 LDA buffer,Y
800 CMP #ASC","
810 BEQ setvars2
820 CMP #13
830 BEQ setvars3
840 INY
850 JMP setvars1
860 :
870 .setvars2
880 INY
890 LDA buffer,Y
900 CMP #ASC","
910 BEQ setvars5
920 :
930 .setvars4
940 DEY
950 LDA #13
960 STA buffer,Y
970 INY
980 JMP setvars
990 :
1000 .setvars5
1010 TYA
1020 PHA
1030 :
1040 .setvars6
1050 INY
1060 LDA buffer,Y
1070 DEY
1080 STA buffer,Y
1090 INY
1100 BNE setvars6
1110 PLA
1120 TAY
1130 JMP setvars1
1140 :
1150 .setvars3
1160 INY
1170 STY end
1180 RTS
1190 :
1200 .doexec
1210 LDA buffer,Y
1220 STA exec_name,Y
1230 INY
1240 CMP #13
1250 BNE doexec
1260 RTS
1270 :
1280 .readchr
1290 STX temp
1300 STY handle
1310 :
1320 .readchr0
1330 LDA flag
1340 BNE readchr1
1350 :
1360 .bget
1370 JSR oldread
1380 BCC next1
1390 JMP reset
1400 :
1410 .next1
1420 CMP #ASC"%"
1430 BEQ readchr2
1440 :
1450 .readout
1460 LDX jamflag
1470 BEQ readoutov
1480 JSR osasci
1490 JMP readchr0
1500 :
1510 .readoutov
1520 LDY handle
1530 LDX temp
1540 CLC
1550 :
1560 .rts
1570 RTS
1580 :
1590 .readchr2
1600 JSR oldread
1610 BCC next2
1620 JMP reset
1630 :
1640 .next2
1650 CMP #ASC"%"
1660 BNE readchr3
1670 JMP readout
1680 :
1690 .readchr1
1700 LDY pos
1710 LDA buffer,Y
1720 PHA
1730 INY
1740 LDA buffer,Y
1750 CMP #13
1760 BNE readchr4
1770 DEC flag
1780 :
1790 .readchr4
1800 PLA
1810 STY pos
1820 JMP readout
1830 :
1840 .readchr3
1850 CMP #ASC"?"
1860 BEQ delete
1870 PHA
1880 AND #&DF
1890 CMP #ASC"C"
1900 BEQ cls
1910 CMP #ASC"J"
1920 BEQ jam
1930 CMP #ASC"U"
1940 BEQ unjam
1950 CMP #ASC"O"
1960 BEQ echo_off
1970 CMP #ASC"E"
1980 BEQ echo_on
1990 CMP #ASC"M"
2000 BEQ dirtitle
2010 CMP #ASC"D"
2020 BEQ date
2030 CMP #ASC"T"
2040 BEQ time
2050 PLA
2060 SEC
2070 SBC #&30
2080 BMI error
2090 CMP #10
2100 BPL error
2110 ASL A
2120 TAX
2130 LDA vars,X
2140 STA pos
2150 INX
2160 LDA vars,X
2170 BEQ error
2180 LDA #1
2190 STA flag
2200 JMP readchr1
2210 :
2220 .oldread
2230 JMP (oldvect)
2240 :
2250 .error
2260 JSR reset
2270 EQUS CHR$0+CHR$0+"No such parameter"+CHR$0
2280 :
2290 .delete
2300 PHA
2310 LDA #127
2320 BNE print
2330 :
2340 .cls
2350 LDA #12
2360 :
2370 .print
2380 JSR nvwrch
2390 JMP echover
2400 :
2410 .jam
2420 INC jamflag
2430 JMP echover
2440 :
2450 .unjam
2460 DEC jamflag
2470 JMP echover
2480 :
2490 .echo_off
2500 OPT FNsetvector(rts,&20E)
2510 BNE echover
2520 :
2530 .echo_on
2540 OPT FNcopypair(oldWRCHV,&20E)
2550 .echover
2560 PLA
2570 JMP bget
2580 :
2590 .dirtitle
2600 JMP readtitle
2610 :
2620 .date
2630 LDX #15
2640 LDY #0
2650 BEQ readclock
2660 :
2670 .time
2680 LDX #21
2690 LDY #16
2700 :
2710 .readclock
2720 TXA
2730 PHA
2740 JSR setptr
2750 LDY #buffer DIV &100
2760 LDX end
2770 LDA #0
2780 STA buffer,X
2790 LDA #&0E
2800 JSR osword
2810 PLA
2820 :
2830 .setfinish
2840 CLC
2850 ADC end
2860 TAX
2870 LDA #13
2880 STA buffer,X
2890 INC flag
2900 PLA
2910 JMP readchr1
2920 :
2930 .readtitle
2940 LDY #buffer DIV &100
2950 LDX end
2960 STX store+1
2970 STY store+2
2980 OPT FNsetvector(0,store+3)
2990 LDX #store
3000 LDY #0
3010 LDA #5
3020 JSR osgbpb
3030 LDY #1
3040 JSR setptr
3050 LDY #0
3060 LDA (store+1),Y
3070 INC end
3080 BNE setfinish
3090 :
3100 .setptr
3110 TYA
3120 CLC
3130 ADC end
3140 STA pos
3150 RTS
3160 :
3170 .oldvect   EQUW 0
3180 .oldWRCHV  EQUW 0
3190 .vars      EQUD 0
3200            EQUD 0
3210            EQUD 0
3220            EQUD 0
3230            EQUD 0
3240 .handle    EQUB 0
3250 .flag      EQUB 0
3260 .jamflag   EQUB 0
3270 .pos       EQUB 0
3280 .temp      EQUB 0
3290 .end       EQUB 0
3300 .exec_text EQUS"EXEC "
3310 .exec_name
3320 ]
3330 ENDPROC
3340 :
3350 DEF FNcopypair(from,to)
3360 [OPT pass
3370 LDA from
3380 STA to
3390 LDA from+1
3400 STA to+1
3410 ]=pass
3420 :
3430 DEF FNsetvector(value,to)
3440 [OPT pass
3450 LDA #value MOD &100
3460 STA to
3470 LDA #value DIV &100
3480 STA to+1
3490 ]=pass
```

Listing 2

```
10 REM Condensed print (EB2)
```





◀ Continued

```
   20 REM Squeeze more characters on a l
ine
   30 REM by Nusret Vardarman
   40 REM for B/B+/E/M/C
   50 REM (c) BAU May 1991
   60 :
   70 MODE 4
   80 width=24
   90 PRINT '"Assembling code....."
  100 FOR pass%=0 TO 2 STEP 2
  110 P%=&900
  120 [OPT pass%
  130 LDA &601
  140 STA &70
  150 LDA &602
  160 STA &71
  170 LDY #0
  180 STY &7C
  190 LDA (&70),Y
  200 STA &7D
  210 INY
  220 LDA (&70),Y
  230 STA &7E
  240 INY
  250 INY
  260 LDA (&70),Y
  270 STA &7F
  280 LDA #5
  290 JSR &FFEE
  300 :
  310 .loop
  320 LDY &7C
  330 LDA (&7D),Y
  340 STA &70
  350 LDA #10
  360 LDX #&70
  370 LDY #0
  380 JSR &FFF1
  390 LDX #0
  400 :
  410 .loop3
  420 LDA &71,X
  430 LSR &71,X
  440 AND &71,X
  450 STA &71,X
  460 INX
  470 CPX #8
  480 BNE loop3
  490 LDA &70
  500 CMP #77
  510 BEQ cont
  520 CMP #87
  530 BEQ cont
  540 CMP #109
  550 BEQ cont
  560 :
  570 .endloop
  580 CMP #119
  590 BEQ cont
  600 :
  610 .back
  620 LDA #23
  630 JSR &FFEE
  640 LDA #159
  650 JSR &FFEE
  660 LDX #0
  670 :
  680 .loop2
  690 LDA &71,X
  700 JSR &FFEE
  710 INX
  720 CPX #8
  730 BNE loop2
  740 LDA #159
  750 JSR &FFEE
  760 LDA #8
  770 JSR &FFEE
  780 LDA #25
  790 JSR &FFEE
  800 LDA #0
  810 JSR &FFEE
  820 LDA #width
  830 JSR &FFEE
  840 LDA #0
  850 JSR &FFEE
  860 JSR &FFEE
  870 JSR &FFEE
  880 INC &7C
  890 LDY &7C
  900 CPY &7F
  910 BNE loop
  920 LDA #4
  930 JSR &FFEE
  940 RTS
  950 :
  960 .cont
  970 LDX #0
  980 :
  990 .loop4
 1000 LDA #0
 1010 JSR ror
 1020 LSR &71,X
 1030 ROR A
 1040 LSR &71,X
 1050 JSR ror
 1060 JSR ror
 1070 STA &71,X
 1080 INX
 1090 CPX #8
 1100 BNE loop4
 1110 JMP back
 1120 :
 1130 .ror
 1140 LSR &71,X
 1150 ROR A
 1160 LSR &71,X
 1170 ROR A
 1180 :
 1190 .end
 1200 RTS:]
 1210 NEXT
 1220 C%=0
 1230 FOR X%=&900 TO &9BC
 1240 C%=C%+?X%
 1250 NEXT
 1260 *SAVE CONDENS 900+BC
```

Listing 3

```
   10 REM Condensed Demo (Eb3)
   20 REM Demonstrate condensed print
   30 REM by Nusret Vardarman
   40 REM for B/B+/E/M/C
   50 REM (c) BAU May 91
   60 :
   70 *LOAD Condens 900
   80 MODE 4
   90 PRINT TAB(0,19) "This is normal te
xt."
  100 PRINT "40 characters per line." TA
B(0,21);
  110 PROCp("This is condensed text.")
  120 PRINT
  130 PROCp("53 characters per line.")
  140 :
  150 COLOUR 129
  160 COLOUR 0
  170 VDU 18,0,0
  180 PRINT TAB(0,24) "This is normal te
xt."
  190 PRINT "40 characters per line."'SP
C20'SPC23 TAB(0,26);
  200 PROCp("This is condensed text.")
  210 PRINT
  220 PROCp("53 characters per line.")
  230 PRINT'
  240 VDU 20
  250 END
  260 :
  270 DEF PROCp(C$)
  280 MOVE POS*32,1023-VPOS*32
  290 CALL &900,C$
  300 ENDPROC
```

Listing 4

```
   10 REM Ellipse Source Code (Eb4)
   20 REM Fast Ellipse drawing
   30 REM by Nusret Vardarman
   40 REM for B/B+/E/M/C
   50 REM (c) BAU May 91
   60 :
   70 MODE 6
   80 PRINT'"Assembling code....."
   90 start=&70
  100 angle=&71
  110 crad=&72
  120 x=&74
  130 y=&76
  140 erad=&80
  150 trig=&78
  160 result=&7A
  170 sign=&7E
  180 :
  190 FOR pass%=0 TO 2 STEP 2
  200 P%=&900
  210 [OPT pass%
  220 :
  230 .circle
  240 LDA #0
  250 STA &83
  260 LDA &600
  270 CMP #6
  280 BNE error
  290 LDX #0
  300 JSR nextint
  310 LDY #0
  320 LDA (trig),Y
  330 STA start
  340 LDX #3
  350 JSR nextint
  360 LDY #0
  370 LDA (trig),Y
  380 STA angle
  390 LDX #6
  400 JSR nextint
  410 LDA (trig),Y
  420 STA crad
  430 INY
  440 LDA (trig),Y
  450 STA crad+1
  460 LDX #9
  470 JSR nextint
  480 LDY #0
  490 LDA (trig),Y
  500 STA x
  510 INY
  520 LDA (trig),Y
  530 STA x+1
  540 LDX #12
  550 JSR nextint
  560 LDY #0
  570 LDA (trig),Y
  580 STA y
  590 INY
  600 LDA (trig),Y
  610 STA y+1
  620 LDX #15
  630 JSR nextint
  640 LDY #0
  650 LDA (trig),Y
  660 STA erad
  670 INY
  680 LDA (trig),Y
  690 STA erad+1
  700 JMP circle1
  710 :
  720 .nextint
  730 LDA &601,X
  740 STA trig
  750 LDA &602,X
  760 STA trig+1
  770 LDA &603,X
  780 CMP #4
  790 BNE error1
  800 RTS
  810 :
  820 .error1
  830 PLA
  840 PLA
  850 :
  860 .error
  870 LDA #7
  880 JMP oswrch
  890 RTS
  900 :
  910 .circle1
  920 LDA start
  930 JSR cos
  940 JSR rmult
  950 LDX #4
  960 JSR xplot
  970 LDA start
  980 JSR sin
  990 JSR rmult
 1000 JSR yplot
 1010 LDA start
 1020 :
 1030 .loop
 1040 PHA
 1050 JSR cos
 1060 JSR rmult
 1070 INC &83
 1080 LDX #5
 1090 JSR xplot
 1100 PLA
 1110 PHA
 1120 JSR sin
 1130 JSR rmult
 1140 DEC &83
 1150 JSR yplot
 1160 PLA
 1170 TAX
 1180 INX
 1190 TXA
 1200 DEC angle
 1210 BPL loop
 1220 RTS
 1230 :
 1240 .xplot
 1250 LDA #25
 1260 JSR oswrch
 1270 TXA
 1280 JSR oswrch
 1290 CLC
 1300 LDA x
 1310 ADC result+1
 1320 JSR oswrch
 1330 LDA x+1
 1340 ADC result+2
 1350 JSR oswrch
 1360 RTS
 1370 :
 1380 .yplot
 1390 CLC
 1400 LDA y
 1410 ADC result+1
 1420 JSR oswrch
 1430 LDA y+1
 1440 ADC result+2
 1450 JSR oswrch
 1460 RTS
 1470 :
 1480 .multiply1
 1490 LDA #0
 1500 STA result
 1510 STA result+1
 1520 STA result+2
 1530 STA result+3
 1540 LDX #16
 1550 :
 1560 .loop1
 1570 LSR trig+1
 1580 ROR trig
 1590 BCC zero
 1600 LDA result+2
 1610 STA &84
 1620 LDA #1
 1630 CMP &83
 1640 BEQ ell
 1650 LDA &84
 1660 CLC
 1670 ADC crad
 1680 STA result+2
 1690 LDA result+3
 1700 ADC crad+1
 1710 STA result+3
 1720 JMP zero
 1730 :
 1740 .ell
 1750 LDA &84
 1760 CLC
 1770 ADC erad
 1780 STA result+2
 1790 LDA result+3
 1800 ADC erad+1
 1810 STA result+3
 1820 :
 1830 .zero
 1840 ROR result+3
 1850 ROR result+2
 1860 ROR result+1
 1870 ROR result
 1880 DEX
 1890 BNE loop1
 1900 RTS
 1910 :
 1920 .rmult
 1930 LDA #0
 1940 STA sign
 1950 BIT trig+1
 1960 BPL plus
 1970 DEC sign
 1980 SEC
 1990 SBC trig
 2000 STA trig
 2010 LDA #0
 2020 SBC trig+1
 2030 STA trig+1
 2040 CLC
 2050 :
 2060 .plus
 2070 ADC trig
 2080 JSR multiply1
 2090 BIT sign
 2100 BPL return
 2110 SEC
 2120 LDA #0
 2130 SBC result
 2140 STA result
 2150 BPL pos
 2160 LDA #1
 2170 BPL neg
 2180 :
 2190 .pos
 2200 LDA #0
 2210 :
 2220 .neg
 2230 LDA #0
 2240 SBC result+1
 2250 STA result+1
 2260 LDA #0
 2270 SBC result+2
 2280 STA result+2
 2290 LDA #0
 2300 SBC result+3
 2310 STA result+3
 2320 :
 2330 .return
 2340 RTS
 2350 :
 2360 .oswrch
 2370 PHP
 2380 JSR &FFEE
 2390 PLP
 2400 RTS
 2410 :
 2420 .cos
 2430 CLC
 2440 ADC #9
 2450 :
 2460 .sin
 2470 CMP #37
 2480 BCC continue
 2490 SBC #36
 2500 JMP sin
 2510 :
 2520 .continue
 2530 ASL A
 2540 TAY
 2550 LDA table,Y
 2560 STA trig
 2570 INY
 2580 LDA table,Y
 2590 STA trig+1
 2600 RTS
 2610 :
 2620 .table
 2630 ]
 2640 NEXT
 2650 FOR I%=0 TO 72 STEP 2
 2660 sin%=256*SIN RAD(5*I%)+0.5
 2670 table!I%=sin%
 2680 NEXT
 2690 C%=0
 2700 FOR X%=&900 TO &AD1
 2710 C%=C%+?X%
 2720 NEXT
 2730 *SAVE Ellipse 900 AD1
```

Listing 5

```
   10 REM Ellipse Demo (Eb5)
   20 REM Demonstrate fast ellipse drawi
ng
   30 REM by Nusret Vardarman
   40 REM for BBC B/B+/M/C/E
   50 REM (C) BAU May 1991
   60 :
   70 MODE 4
   80 VDU 23;8202,0;0;0;0;
   90 *FX 229,1
  100 PRINT'"Arc,Circle,Ellipse drawing"
'"program demonstration"
```

Continued ▶

◀ Continued

```
  110 PRINT STRING$(30,"_")''" Demo"''"
Test"''" Exit"'
  120 REPEAT
  130 G=GET
  140 UNTIL G=68 OR G=84 OR G=69 OR G=27
  150 CLS
  160 IF G=68 PROCdemo
  170 IF G=84 PROCtest
  180 *FX 229,0
  190 END
  200 :
  210 DEF PROCtest
  220 S%=0
  230 A%=36
  240 X%=300
  250 Y%=400
  260 TIME=0
  270 FOR R%=10 TO 190 STEP 20
  280 MOVE X%,Y%+R%
  290 FOR T=0 TO 6.3 STEP.17
  300 DRAW X%+R%*SIN(T),Y%+R%*COS(T)
  310 NEXT
  320 NEXT
  330 PRINT TAB(1,29)"BASIC"'" Time= ";T
IME/100" sec":X%=900
  340 :
  350 TIME=0
  360 FOR R%=10 TO 190 STEP 20
  370 E%=R%
  380 PROCcall
  390 NEXT
  400 PRINT TAB(22,29)"ACE" TAB(22,30)"T
ime= ";TIME/100" sec"
  410 PROCwait
  420 ENDPROC
  430 :
  440 DEF PROCdemo
  450 A%=30
  460 X%=200
  470 Y%=800
  480 FOR R%=10 TO 130 STEP 20
  490 E%=R%
  500 PROCcall
  510 NEXT
  520 Y%=500
  530 FOR R%=10 TO 130 STEP 20
  540 E%=R%/2
  550 PROCcall
  560 NEXT
  570 A%=36
  580 X%=700
  590 Y%=800
  600 E%=45
  610 FOR R%=10 TO 160 STEP 30
  620 E%=E%+8
  630 PROCcall
  640 NEXT
  650 X%=600
  660 Y%=370
  670 R%=360
  680 FOR A%=1 TO 36
  690 E%=R%
  700 PROCcall
  710 R%=R%-10
  720 NEXT
  730 X%=1120
  740 Y%=510
  750 V%=1
  760 FOR R%=10 TO 122 STEP 19
  770 V%=V%+1
  780 E%=R%*V%/2
  790 PROCcall
  800 NEXT
  810 X%=200
  820 Y%=200
  830 A%=35
  840 R%=10
  850 FOR A%=1 TO 36 STEP 2
  860 E%=R%
  870 PROCcall
  880 R%=R%+8
  890 NEXT
  900 X%=700
  910 Y%=180
  920 A%=36
  930 FOR E%=10 TO 80 STEP 10
  940 R%=E%*2
  950 PROCcall
  960 NEXT
  970 PROCwait
  980 ENDPROC
  990 :
 1000 DEF PROCwait
 1010 PRINTTAB(1,31)"Press any key...";
 1020 G=GET
 1030 ENDPROC
 1040 :
 1050 DEF PROCcall
 1060 CALL &900,S%,A%,R%,X%,Y%,E%
 1070 ENDPROC
```

Core War

Listing 1

```
   10 REM Core war Assembler (Core1)
   20 REM by Emmet Spier
   30 REM for B/B+/M/C/A
   40 REM (c) BAU May 1991
   50 :
   60 MODE 3
   70 :
   80 REM the value of mem is set below
   90 maxmem=8000
  100 REM for BBC Verison set to 4000
  110 :
  120 maxlabel=100
  130 DIM store 1000,label(maxlabel)
  140 FOR x=0 TO maxlabel
  150 label(x)=-1
  160 NEXT
  170 :
  180 ON ERROR CLOSE#0:PRINT':REPORT:PRI
NT" at line ";ERL:END
  190 PRINT'"Core War Assembler"
  200 PRINT'"Maxmem = ";maxmem;"  TAKE N
OTE."
  210 INPUT'"Compilation file : S."data$
  220 INPUT'"File to save under : O."sav
e$
  230 :
  240 REM if you are not using discs the
n remove the following lines
  250 data$="S."+data$
  260 save$="O."+save$
  270 :
  280 PRINT'"Assembling file ";data$
  290 PRINT'"Please wait first pass asse
mbly proceeding"'
  300 PROCfirstpass(data$)
  310 length=FNsecondpass(data$)
  320 PRINT''"Insert disk for save and p
ress any key"
  330 IF GET
  340 OSCLI("SAVE "+save$+" "+STR$~(stor
e)+" "+STR$~(store+(length)*5))
  350 END
  360 :
  370 DEF FNgetline(in)
  380 LOCAL l$,c
  390 REPEAT
  400 c=BGET#in
  410 IF c>96 AND c<123 THEN c=c AND &DF
  420 IF c=9 THEN c=32
  430 l$=l$+CHR$(c)
  440 UNTIL c=13 OR c=10 OR PTR#in=EXT#i
n
  450 l$=LEFT$(l$,(LEN(l$)-1))
  460 =l$
  470 :
  480 DEF FNstrip(A$)
  490 a=0
  500 REPEAT
  510 a=a+1
  520 UNTIL MID$(A$,a,1)<>" "
  530 =MID$(A$,a,LENA$)
  540 :
  550 DEF FNstriplabel(A$)
  560 LOCAL a
  570 lab$=""
  580 A$=FNstrip(A$)
  590 IF LEFT$(A$,1)="." THEN A$=FNstrip
(MID$(A$,2,LEN(A$)-1)):a=-1:REPEAT:a=a+1
:UNTIL INSTR("0123456789",MID$(A$,a,1))=
0 OR MID$(A$,a,1)="":lab$="."+LEFT$(A$,a
-1):A$=FNstrip(MID$(A$,a,LENA$))
  600 =A$
  610 :
  620 DEF PROCfirstpass(data$)
  630 LOCAL end,handle,a$,point
  640 end=FALSE
  650 handle=OPENIN(data$)
  660 IF handle=0 THEN CLOSE#handle:PRIN
T''"File ";data$;" does not exist":END
  670 point=0
  680 REPEAT
  690 a$=FNstrip(FNgetline(handle))
  700 IF LEFT$(a$,1)="." AND VAL MID$(a$
,2,LEN a$) >maxlabel THEN PRINT"Label nu
mber to big at code line ";point:CLOSE#h
andle:VDU3:END
  710 IF LEFT$(a$,1)="." AND label(VAL M
ID$(a$,2,LEN(a$))) <> -1 THEN PRINT"Doub
le declare of label .";VAL MID$(a$,2,LEN
(a$)):VDU3:CLOSE#0:END
  720 IF LEFT$(a$,1)="." THEN label(VAL
MID$(a$,2,LEN(a$)) )=point
  730 IF FNstriplabel(a$) <> "" AND LEFT
$(FNstriplabel(a$),1)<> "\" THEN point=p
oint+1
  740 UNTIL (EXT#handle=PTR#handle) OR e
nd
  750 CLOSE #handle
  760 ENDPROC
  770 :
  780 DEF FNsecondpass(data$)
  790 LOCAL handle,a$,A$,B$,b,end,point,
error
  800 end=FALSE
  810 error= FALSE
  820 point=0
  830 handle=OPENIN(data$)
  840 REPEAT
  850 type=0
  860 b=0
  870 a$=FNstrip(FNgetline(handle))
  880 a$=FNstriplabel(a$)
  890 IF LEFT$(a$,1)<>"\" THEN B$=FNstri
p(MID$(a$,4,LEN(a$)-3)):a$=LEFT$(a$,3)
  900 IF a$="DAT" THEN PROCprocess(B$,0,
2):b=1
  910 IF a$="MOV" THEN PROCprocess(B$,1,
0):b=1
  920 IF a$="ADD" THEN PROCprocess(B$,2,
0):b=1
  930 IF a$="SUB" THEN PROCprocess(B$,3,
0):b=1
  940 IF a$="JMP" THEN PROCprocess(B$,4,
1):b=1
  950 IF a$="JMZ" THEN PROCprocess(B$,5,
0):b=1
  960 IF a$="JNE" THEN PROCprocess(B$,6,
0):b=1
  970 IF a$="JMN" THEN PROCprocess(B$,6,
0):b=1
  980 IF a$="DJN" THEN PROCprocess(B$,7,
0):b=1
  990 IF a$="CMP" THEN PROCprocess(B$,8,
0):b=1
 1000 IF a$="SPL" THEN PROCprocess(B$,10
,1):b=1
 1010 PRINTTAB(24);lab$;TAB(28);
 1020 IF LEFT$(a$,1)<>"\" THEN PRINTa$;"
 ";B$ ELSE PRINTa$
 1030 IF a$<>"" AND LEFT$(a$,1)<>"\" AND
 b=0 THEN PRINT'"Command ";a$;" ";B$;"No
t Recognised. IGNORING"'
 1040 IF b=1 THEN point=point+1
 1050 UNTIL (EXT#handle=PTR#handle) OR e
nd OR error
 1060 CLOSE#handle
 1070 IF error THEN VDU3:END
 1080 =point
 1090 :
 1100 DEF PROCprocess(A$,Op,type)
 1110 LOCAL X,mA,mB,A,m,s,B$
 1120 IF type=1 THEN PROCpr(A$):PROCstor
e(Op,m,0,s,0,point):ENDPROC
 1130 IF type=2 THEN PROCpr(A$):PROCstor
e(Op,m,0,0,s,point):ENDPROC
 1140 X=0
 1150 REPEAT
 1160 X=X+1
 1170 UNTIL MID$(A$,X,1)=" " OR MID$(A$,
X,1)=CHR$13 OR MID$(A$,X,1)=CHR$10
 1180 IF MID$(A$,X,1)=CHR$13 OR MID$(A$,
X,1)=CHR$10 THEN PRINT"Missing parameter
"
 1190 PROCpr(LEFT$(A$,X-1)):mA=m:A=s
 1200 A$=FNstrip(MID$(A$,X,LEN(A$)-(X-1)
))
 1210 PROCpr(A$)
 1220 PROCstore(Op,mA,m,A,s,point)
 1230 ENDPROC
 1240 :
 1250 DEF PROCpr(B$)
 1260 IF B$="" THEN error=TRUE
 1270 m=1
 1280 IF LEFT$(B$,1)="#" THEN m=0:B$=FNs
trip(MID$(B$,2,LEN B$))
 1290 IF LEFT$(B$,1)="@" THEN m=2:B$=FNs
trip(MID$(B$,2,LEN B$))
 1300 IF LEFT$(B$,1)="<" THEN m=3:B$=FNs
trip(MID$(B$,2,LEN B$))
 1310 IF LEFT$(B$,1)="." THEN IF label(V
AL MID$(B$,2,LEN B$) ) = -1 THEN PRINT"L
abel .";MID$(B$,2,LEN B$);" not declared
 at code line ";point:CLOSE#handle:VDU3:
END
 1320 IF LEFT$(B$,1)="." THEN IF label(V
AL MID$(B$,2,LEN B$) ) <> -1 THEN B$=STR
$(label(VAL MID$(B$,2,LEN B$))-point)
 1330 s=VAL(B$)
 1340 ENDPROC
 1350 :
 1360 DEF PROCstore(Op,mA,mB,A,B,l)
 1370 LOCAL p
 1380 IF A<0 THEN A=maxmem+(A MOD maxmem
) ELSE A=A MOD maxmem
 1390 IF B<0 THEN B=maxmem+(B MOD maxmem
) ELSE B=B MOD maxmem
 1400 p=(l MOD maxmem)*5
 1410 store?p=(Op+16*mA+64*mB)
 1420 store?(p+1)=A MOD 256
 1430 store?(p+2)=A DIV 256
 1440 store?(p+3)=B MOD 256
 1450 store?(p+4)=B DIV 256
 1460 IF NOT error PRINTTAB(0);store?p;T
AB(6);A;TAB(13);B;
 1470 IF error THEN PRINT"Missing parame
ter";
 1480 ENDPROC
```

Listing 2

```
   10 REM BBC Corewar (Core2)
   20 REM by Emmet Spier
   30 REM for B/B+/M/C
   40 REM (c) BAU May 1991
   50 :
   60 REM the value of 'mem' is set belo
w
   70 :
   80 mem=4000
   90 :
  100 ON ERROR REPORT:PRINT" at line ";E
RL:END
  110 MODE 7
  120 PROCinit
  130 :
  140 REM remove the following line if y
ou do not have a disc drive
  150 *.O
  160 :
  170 FOR loop=0 TO maxplr
  180 PRINT"Name of file for player ";lo
op;
  190 INPUT" :"pl$(loop)
  200 NEXT
  210 CLS
  220 PROCsetscr
  230 FOR loop=0 TO maxplr
  240 OSCLI("LOAD O."+pl$(loop)+" "+STR$
~(s%+(pc(loop,0)*5))):REM remove the O.
if you are not using directories
  250 x=OPENUP("O."+pl$(loop)):cycle=EXT
#x:CLOSE#x:REM remove the "O."+ here too
  260 FOR loop2=0 TO cycle/5
  270 PROCpoint(pc(loop,0)+loop2)
  280 NEXT
  290 NEXT
  300 :
  310 cycle=0
  320 start=TIME
  330 REPEAT
  340 plr=0
  350 REPEAT
  360 IF (splpo(0,0)+splpo(1,0)*100)<>ol
dsum THEN PRINTTAB(0,0);pl$(0);"(";splpo
(0,0)+1;"), ";pl$(1);"(";splpo(1,0)+1;")
  ":oldsum=splpo(0,0)+splpo(1,0)*100
  370 spl=splpo(plr,1)
  380 exec=pc(plr,spl)
  390 PROCget(exec)
  400 PROCpoint(exec)
  410 PROCpoint(exec)
  420 exec=FNact(Op,mA,mB,A,B,exec) MOD
mem
  430 IF NOT exec pc(plr,spl)=exec
  440 IF NOT exec splpo(plr,1)=splpo(plr
,1)+1
  450 IF splpo(plr,1)>splpo(plr,0) THEN
splpo(plr,1)=0
  460 plr=plr+1
  470 cycle=cycle+1
  480 UNTIL plr=(maxplr+1) OR splpo(plr-
1,0)=-1
  490 UNTIL splpo(plr-1,0)=-1
  500 PRINTTAB(0,2);pl$(plr-1);" lost af
ter the ";cycle;" cycle."
  510 PRINT'"Time taken :";(TIME-start)/
100
  520 END
  530 :
  540 DEF PROCinit
  550 maxplr=1:maxspl=64
  560 DIM splpo(maxplr,1)
  570 DIM pc(maxplr,maxspl)
  580 DIM pl$(maxplr)
  590 DIM s% mem*5
  600 :
  610 pc(0,0)=RND(mem)
  620 REPEAT pc(1,0)=RND(mem)
  630 UNTIL ABS(pc(0,0)-pc(1,0))>1000
  640 oldsum=-1
  650 plr=0
  660 ENDPROC
  670 :
  680 DEF PROCsto(Op,mA,mB,A,B,l)
  690 LOCAL p
  700 IF A<0 THEN A=mem+(A MOD mem) ELSE
 A=A MOD mem
  710 IF B<0 THEN B=mem+(B MOD mem) ELSE
 B=B MOD mem
  720 p=(l MOD mem)*5
  730 s%?p=(Op+16*mA+64*mB)
  740 s%?(p+1)=A MOD 256
  750 s%?(p+2)=A DIV 256
  760 s%?(p+3)=B MOD 256
  770 s%?(p+4)=B DIV 256
  780 PROCpoint(l MOD mem)
  790 ENDPROC
  800 :
  810 DEF PROCget(l)
  820 LOCAL p
  830 p=(l MOD mem)*5
  840 Op=(s%?p AND &F)
  850 mA=(s%?p AND &30)/16
  860 mB=(s%?p AND &C0)/64
  870 A=(!(s%+p+1) AND &FFFF)
  880 B=(!(s%+p+3) AND &FFFF)
  890 ENDPROC
  900 :
  910 DEF FNact(Op,mA,mB,A,B,loc)
  920 LOCAL pA,pB,t$
  930 IF Op<1 OR Op>11 THEN t$=FNkil:=-1
  940 PROCcalc(mA,A,mB,B,loc)
  950 t$=FNon("mov,add,sub,jmp,jmz,jne,d
jn,cmp,kil,spl",Op)
  960 =loc+1
  970 :
  980 DEF PROCcalc(mA,A,mB,B,st)
  990 LOCAL Op,b,mb,l
 1000 pA=FNcalc_add(mA,A,st)
 1010 pB=FNcalc_add(mB,B,st)
 1020 pA=pA MOD mem:pB=pB MOD mem
 1030 b=B:mb=mB
 1040 IF mA=3 THEN l=A+st:PROCget(l):PRO
Csto(Op,mA,mB,A,B-1,l)
 1050 IF mb=3 THEN l=b+st:PROCget(l):PRO
Csto(Op,mA,mB,A,B-1,l)
 1060 pA=pA MOD mem:pB=pB MOD mem
 1070 ENDPROC
 1080 :
 1090 DEF FNcalc_add(m,a,l)
 1100 LOCAL p
 1110 IF m=0 THEN p=a
 1120 IF m=1 THEN p=(a+l) MOD mem
 1130 IF m=2 THEN p=((a+l)MOD mem)+!(s%+
((a+l)MOD mem)*5+3)AND&FFFF
 1140 IF m=3 THEN p=((a+l)MOD mem)-1+!(s
%+((a+l)MOD mem)*5+3)AND&FFFF
 1150 =p
 1160 :
```

Continued ▶



◀ Continued

```
1170 DEF FNmov
1180 IF mA=0 THEN PROCsto(0,0,0,0,pA,pB
):="MOV"
1190 PROCget(pA)
1200 PROCsto(Op,mA,mB,A,B,pB)
1210 ="MOV"
1220 :
1230 DEF FNadd
1240 IF mA=0 THEN PROCget(pB):PROCsto(O
p,mA,mB,A,B+pA,pB):="ADD"
1250 PROCget(pA)
1260 pA=B
1270 PROCget(pB)
1280 PROCsto(Op,mA,mB,A,B+pA,pB)
1290 ="ADD"
1300 :
1310 DEF FNsub
1320 IF mA=0 THEN PROCget(pB):PROCsto(O
p,mA,mB,A,B-pA,pB):="SUB"
1330 PROCget(pA)
1340 pA=B
1350 PROCget(pB)
1360 PROCsto(Op,mA,mB,A,B-pA,pB)
1370 ="SUB"
1380 :
1390 DEF FNjmp
1400 loc=pA-1
1410 ="JMP"
1420 :
1430 DEF FNjmz
1440 PROCget(pB)
1450 IF B=0 THEN loc=pA-1
1460 ="JMZ"
1470 :
1480 DEF FNjne
1490 PROCget(pB)
1500 IF B<>0 THEN loc=pA-1
1510 ="JNE"
1520 :
1530 DEF FNdjn
1540 PROCget(pB)
1550 PROCsto(Op,mA,mB,A,B-1,pB)
1560 IF B-1<>0 THEN loc=pA-1
1570 ="DJN"
1580 :
1590 DEF FNcmp
1600 LOCAL _m
1610 IF mA=0 OR mB =0 THEN PROCcmp1 ELS
E PROCcmp2
1620 ="CMP"
1630 :
1640 DEF PROCcmp1
1650 _m=mB
1660 IF mA<>0 THEN PROCget(pA):pA=B
1670 IF _m<>0 THEN PROCget(pB):pB=B
1680 IF pA<>pB THEN loc=loc+1
1690 ENDPROC
1700 :
1710 DEF PROCcmp2
1720 LOCAL _Op,_mA,_mB,_A,_B
1730 PROCget(pA)
1740 _Op=Op
1750 _mA=mA
1760 _mB=mB
1770 _A=A
1780 _B=B
1790 PROCget(pB)
1800 IF _Op=Op AND _mA=mA AND _mB=mB AN
D _A=A AND _B=B THEN loc=loc+1
1810 ENDPROC
1820 :
1830 DEF FNspl
1840 LOCAL l
1850 IF splpo(plr,0)=maxspl THEN ENDPRO
C
1860 FOR l=splpo(plr,0) TO (splpo(plr,1
)+1) STEP -1
1870 pc(plr,l+1)=pc(plr,l)
1880 NEXT
1890 pc(plr,splpo(plr,1)+1)=pA
1900 splpo(plr,0)=splpo(plr,0)+1
1910 ="SPL"
1920 :
1930 DEF FNkil
1940 LOCAL a,l
1950 loc=-2
1960 FOR l=splpo(plr,1)+1 TO splpo(plr,
0)
1970 pc(plr,l-1)=pc(plr,l)
1980 NEXT
1990 splpo(plr,0)=splpo(plr,0)-1
2000 ="KIL"
2010 :
2020 DEF FNon(a$,A%)
2030 LOCAL M%:M%=0
2040 REPEAT
2050 A%=A%-1
2060 a$=MID$(a$,M%+1)
2070 M%=INSTR(a$+",",",")
2080 UNTIL A%<1 OR M%>LEN(a$)
2090 =EVAL("FN"+LEFT$(a$,M%-1))
2100 :
2110 DEF PROCpoint(l)
2120 LOCAL x,y,sqx,sqy,ptx,pty,n
2130 x=l-INT(l/78)*78
2140 y=INT(l/78)
2150 sqx=INT(x/2)
2160 sqy=INT(y/3)
2170 ptx=x-sqx*2
2180 pty=y-sqy*3
2190 n=4^pty*2^ptx
2200 IF ptx=1 AND pty=2 THEN n=n+32
2210 IF (?(&7C00+sqx+1+(sqy+3)*40) AND
n) = n THEN n=-n
2220 ?(&7C00+sqx+1+(sqy+3)*40)=?(&7C00+
sqx+1+(sqy+3)*40)+n
2230 ENDPROC
2240 :
2250 DEF PROCsetscr
2260 LOCAL loop
2270 FOR loop=0TO24:PRINTTAB(0,loop);CH
R$151;:NEXT
2280 PRINTTAB(1,0);
2290 ENDPROC
```

Listing 3

```
10 REM >CoreARM (Core3)
20 REM Arc Corewars
30 REM by Emmet Spier
40 REM for Arc only
50 REM (c) BAU May 1991
60 :
70 MODE 0
80 PROCinit
90 *. O
100 :
110 PROCpc(0,0,RND(mem))
120 REPEAT
130 apple=RND(mem)
140 UNTIL ABS(FNpc(0,0)-apple)>1000
150 PROCpc(1,0,apple)
160 PROCpc(0,0,2000)
170 PROCpc(1,0,6000)
180 :
190 FOR lp=0 TO maxplr
200 PRINT"Name of file for player ";lp
;:INPUT" :"pl$(lp)
210 NEXT
220 :
230 MODE 12
240 OFF
250 FOR lp=0 TO maxplr
260 GCOL 0,pcol(lp)
270 x=OPENUP("O."+pl$(lp))
280 FOR lp2=0 TO EXT#x/5-1
290 a=BGET#x
300 PROCsto(a AND &F,(a AND &30)/16,(a
 AND &C0)/64,BGET#x+BGET#x*256,BGET#x+BG
ET#x*256,FNpc(lp,0)+lp2)
310 NEXT
320 CLOSE#x
330 $(plr_names+lp*16)=LEFT$(pl$(lp),1
5)
340 ?(plr_names+lp*16+LEN(LEFT$(pl$(lp
),15)))=0
350 NEXT
360 :
370 start=TIME
380 CALL lets_play_corewar
390 end=TIME
400 PRINT''"Time taken :";(end-start)/
100;" secs"
410 :
420 END
430 :
440 DEF PROCinit
450 maxplr=1
460 maxspl=64
470 stringlen=10
480 DIM pl$(maxplr)
490 mem=8000
500 DIM core% mem*5+20
510 FOR loop%=core% TO core%+(mem*5+20
) STEP4
520 !loop%=0
530 NEXT
540 DIM pcol(maxplr)
550 pcol(0)=1
560 pcol(1)=4
570 white=7
580 PROCassemble
590 ENDPROC
600 :
610 DEF PROCsto(Op,mA,mB,A,B,l)
620 LOCAL p
630 IF A<0 THEN A=mem+(A MOD mem) ELSE
 A=A MOD mem
640 IF B<0 THEN B=mem+(B MOD mem) ELSE
 B=B MOD mem
650 p=(l MOD mem)*5
660 core%?p=(Op+16*mA+64*mB)
670 core%?(p+1)=A MOD 256
680 core%?(p+2)=A DIV 256
690 core%?(p+3)=B MOD 256
700 core%?(p+4)=B DIV 256
710 PROCpoint(l)
720 ENDPROC
730 :
740 DEF FNpc(p,s)=(!(pc_table+(s*maxpl
r*4)+p*2) AND &ffff)
750 :
760 DEF PROCpc(p,s,n):LOCAL a:a=pc_tab
le+(s*maxplr*4)+p*2
770 a?0=n MOD 256:a?1=n DIV 256
780 ENDPROC
790 :
800 DEF FNpeek(l,p)=!(l+p*4)
810 :
820 DEF PROCpoint(l)
830 LOCAL x,y
840 x=((l AND 127)*10)+0
850 y=960-((l>>7)*12)
860 MOVE x,y
870 PLOT 101,x+6,y-4
880 ENDPROC
890 :
900 DEF PROCassemble
910 DIM code% 5120
920 FOR pass=0 TO 2 STEP 2
930 pc   = 15
940 link = 14
950 sp   = 13
960 pB   = 12
970 pA   = 11
980 B    = 10
990 A    = 9
1000 mB   = 8
1010 mA   = 7
1020 Op   = 6
1030 loc  = 5
1040 dum2 = 4
1050 dum  = 3
1060 P%=code%
1070 [
1080 OPT pass
1090 :
1100 .lets_play_corewar
1110 stmfd r13!,{link}
1120 mov   r0,#0
1130 FNadr(3,plr_store)
1140 str   r0,[r3,#0]
1150 FNadr(3,cycles)
1160 str   r0,[r3,#0]
1170 FNadr(3,top_store)
1180 str   r0,[r3,#0]
1190 str   r0,[r3,#4]
1200 FNadr(3,spl_store)
1210 str   r0,[r3,#0]
1220 str   r0,[r3,#4]
1230 FNadr(3,old_top_sum)
1240 mov   r0,#1
1250 str   r0,[r3,#0]
1260 :
1270 .main_program_loop
1280 FNadr(3 ,top_store)
1290 ldr   r6,[r3,#0]
1300 ldr   r7,[r3,#4]
1310 add   r0,r6 ,r7,lsl#16
1320 FNadr(3,old_top_sum)
1330 ldr   r1,[r3,#0]
1340 cmp   r1,r0
1350 beq   here_we_go
1360 str   r0,[r3,#0]
1370 :
1380 swi   &100+30
1390 FNadr(5,plr_names)
1400 mov   r0,r5
1410 swi   "OS_Write0"
1420 swi   &100+ASC" "
1430 swi   &100+ASC"("
1440 add   r0,r6,#1
1450 FNadr(1,string)
1460 mov   r2,#stringlen
1470 swi   "OS_BinaryToDecimal"
1480 mov   r0,r1
1490 mov   r1,#0
1500 strb  r1,[r0,r2]
1510 swi   "OS_Write0"
1520 swi   &100+ASC")"
1530 swi   &100+ASC","
1540 swi   &100+ASC" "
1550 add   r0 ,r5 ,#16
1560 swi   "OS_Write0"
1570 swi   &100+ASC" "
1580 swi   &100+ASC"("
1590 add   r0,r7 ,#1
1600 FNadr(1 ,string)
1610 mov   r2,#stringlen
1620 swi   "OS_BinaryToDecimal"
1630 mov   r0,r1
1640 mov   r1,#0
1650 strb  r1,[r0,r2]
1660 swi   "OS_Write0"
1670 swi   &100+ASC")"
1680 swi   &100+ASC" "
1690 :
1700 .here_we_go
1710 bl act
1720 cmn   r0,#1
1730 :
1740 FNadr(3,plr_store)
1750 ldr   r0,[r3,#0]
1760 :
1770 FNadr(3,top_store)
1780 ldr   r1,[r3 ,r0,lsl #2]
1790 :
1800 FNadr(3,spl_store)
1810 ldr   r2,[r3 ,r0,lsl #2]
1820 :
1830 addne r2,r2,#1
1840 cmp   r2,r1
1850 movhi r2,#0
1860 str   r2,[r3,r0,lsl #2]
1870 .main_cont
1880 :
1890 FNadr(3,cycles)
1900 ldr   r0,[r3,#0]
1910 add   r0,r0 ,#1
1920 str   r0,[r3,#0]
1930 :
1940 FNadr(3,plr_store)
1950 ldr   r0,[r3 ,#0]
1960 FNadr(3 ,top_store)
1970 ldr   r1,[r3 ,r0,lsl #2]
1980 cmn   r1,#1
1990 beq   someone_has_died
2000 :
2010 FNadr(3,plr_store)
2020 ldr   r0,[r3,#0]
2030 add   r0,r0,#1
2040 cmp   r0,#(maxplr+1)
2050 movge r0,#0
2060 str   r0,[r3,#0]
2070 :
2080 mov   r0,#&79
2090 mov   r1,#(112 EOR &80)
2100 swi   "OS_Byte"
2110 cmp   r1,#0
2120 ble main_program_loop
2130 FNadr(0 ,escape_text)
2140 swi   "OS_Write0"
2150 b     end_program
2160 :
2170 .someone_has_died
2180 swi   &100+13
2190 swi   &100+10
2200 FNadr(5,plr_names)
2210 FNadr(3,plr_store)
2220 ldr   r1,[r3 ,#0]
2230 mov   r2,#16
2240 mla   r0,r1,r2,r5
2250 swi   "OS_Write0"
2260 FNadr(0,lost_text)
2270 swi   "OS_Write0"
2280 :
2290 .end_program
2300 FNadr(3,cycles)
2310 ldr   r0,[r3,#0]
2320 FNadr(1,string)
2330 mov   r2,#stringlen
2340 swi   "OS_BinaryToDecimal"
2350 mov   r0,r1
2360 mov   r1,#0
2370 strb  r1,[r2,#0]
2380 swi   "OS_Write0"
2390 FNadr(0,cycles_text)
2400 swi   "OS_Write0"
2410 ldmfd  r13!,{pc}
2420 :
2430 .act
2440 stmfd r13!,{link}
2450 FNadr(2,plr_store)
2460 ldr   r0,[r2 ,#0]
2470 FNadr(2,spl_store)
2480 add   r2,r2,r0,lsl #2
2490 ldr   dum,[r2,#0]
2500 FNadr(2,pc_table)
2510 mov   r1,#((maxplr+1)*2)
2520 mla   r2,r1,dum,r2
2530 add   r2,r2,r0,lsl #1
2540 ldrb  loc,[r2,#0]
2550 ldrb  r0,[r2,#1]
2560 add   loc,loc,r0,lsl #8
2570 FNadr(2,old_pc)
2580 str   loc,[r2,#0]
2590 :
2600 mov   r0,#18
2610 swi   "OS_WriteC"
2620 mov   r0,#0
2630 swi   "OS_WriteC"
2640 mov   r0,#white
2650 swi   "OS_WriteC"
2660 bl    plot_point
2670 :
2680 mov   r0,#18
2690 swi   "OS_WriteC"
2700 mov   r0,#0
2710 swi   "OS_WriteC"
2720 FNadr(2,plr_store)
2730 ldr   r0,[r2,#0]
2740 FNadr(1,col_table)
2750 add   r1,r1,r0
2760 ldrb  r0,[r1,#0]
2770 swi   "OS_WriteC"
2780 :
2790 stmfd r13!,{loc}
2800 bl    get
2810 bl    calc
2820 cmp   Op,#10
2830 bhi   op_dat
2840 FNadr(dum,opcodeblock)
2850 add   pc,dum,Op,lsl #2
2860 :
2870 .backtobasic
2880 FNadr(2,old_pc)
2890 ldr   loc ,[r2,#0]
2900 bl    plot_point
2910 :
2920 ldmfd r13!,{loc}
2930 cmn   loc,#1
2940 beq   back_cont
2950 add   loc,loc ,#1
2960 cmp   loc,#0
2970 addlt loc,loc,#mem
2980 cmp   loc,#mem
2990 subge loc,loc,#mem
3000 FNadr(2,plr_store)
3010 ldr   r0,[r2,#0]
3020 FNadr(2,spl_store)
3030 add   r2,r2,r0,lsl #2
3040 ldr   dum,[r2,#0]
3050 FNadr(2,pc_table)
3060 mov   r1,#((maxplr+1)*2)
3070 mla   r2,r1,dum,r2
3080 add   r2,r2,r0,lsl #1
3090 and   r0,loc,#&00ff
3100 strb  r0,[r2,#0]
3110 mov   r0,loc,lsr #8
3120 strb  r0,[r2,#1]
3130 .back_cont
3140 mov   r0,loc
3150 ldmfd r13!,{pc}
3160 :
3170 .opcodeblock
3180 b     op_dat
```

Continued ▶

◀ Continued

```
3190 b     op_mov
3200 b     op_add
3210 b     op_sub
3220 b     op_jmp
3230 b     op_jmz
3240 b     op_jne
3250 b     op_djn
3260 b     op_cmp
3270 b     op_unknown
3280 b     op_spl
3290 :
3300 .calc
3310 stmfd r13!,{link}
3320 cmp   mA,#0
3330 moveq pA,A
3340 beq   calc_B
3350 cmp   mA,#1
3360 addeq pA,A,loc
3370 beq   calc_B
3380 cmp   mA,#3
3390 bne   calc_indirA
3400 stmfd r13!,{loc-B}
3410 add   loc,A,loc
3420 bl    get
3430 sub   B,B,#1
3440 bl    store
3450 add   pA,loc,B
3460 ldmfd r13!,{loc-B}
3470 b     calc_B
3480 :
3490 .calc_indirA
3500 stmfd r13!,{loc-B}
3510 add   loc,A,loc
3520 bl    get
3530 add   pA,loc,B
3540 ldmfd r13!,{loc-B}
3550 :
3560 .calc_B
3570 cmp   mB,#0
3580 moveq pB,B
3590 beq   calc_end
3600 cmp   mB,#1
3610 addeq pB,B,loc
3620 beq   calc_end
3630 cmp   mB,#3
3640 bne   calc_indirB
3650 stmfd r13!,{loc-B}
3660 add   loc,B,loc
3670 bl    get
3680 sub   B,B,#1
3690 bl    store
3700 add   pB,loc,B
3710 ldmfd r13!,{loc-B}
3720 b     calc_end
3730 :
3740 .calc_indirB
3750 stmfd r13!,{loc-B}
3760 add   loc,B,loc
3770 bl    get
3780 add   pB,loc,B
3790 ldmfd r13!,{loc-B}
3800 :
3810 .calc_end
3820 cmp   pA,#0
3830 addlt pA,pA,#mem
3840 cmp   pA,#mem
3850 subge pA,pA,#mem
3860 cmp   pB,#0
3870 addlt pB,pB,#mem
3880 cmp   pB,#mem
3890 subge pB,pB,#mem
3900 ldmfd r13!,{pc}
3910 :
3920 .op_mov
3930 cmp   mA,#0
3940 bne   mov_notimmediate
3950 mov   Op,#0
3960 mov   A,#0
3970 mov   B,pA
3980 mov   loc,pB
3990 bl    store
4000 b     backtobasic
4010 :
4020 .mov_notimmediate
4030 mov   loc,pA
4040 bl    get
4050 mov   loc,pB
4060 bl    store
4070 b     backtobasic
4080 ;
4090 .op_add
4100 cmp   mA,#0
4110 bne   add_notimmediate
4120 mov   loc,pB
4130 bl    get
4140 add   B,B,pA
4150 bl    store
4160 b     backtobasic
4170 :
4180 .add_notimmediate
4190 mov   loc,pA
4200 bl    get
4210 mov   pA,B
4220 mov   loc,pB
4230 bl    get
4240 add   B,B,pA
4250 bl    store
4260 b     backtobasic
4270 :
4280 .op_sub
4290 cmp   mA,#0
4300 bne   sub_notimmediate
4310 mov   loc,pB
4320 bl    get
4330 sub   B,B,pA
4340 bl    store
4350 b     backtobasic
4360 :
4370 .sub_notimmediate
4380 mov   loc,pA
4390 bl    get
4400 mov   pA,B
4410 mov   loc,pB
4420 bl    get
4430 sub   B,B,pA
4440 bl    store
4450 b     backtobasic
4460 :
4470 .op_jmp
4480 ldmfd r13!,{loc}
4490 sub   loc,pA,#1
4500 stmfd r13!,{loc}
4510 b     backtobasic
4520 :
4530 .op_jmz
4540 mov   loc,pB
4550 bl    get
4560 cmp   B,#0
4570 bne   backtobasic
4580 ldmfd r13!,{loc}
4590 sub   loc,pA,#1
4600 stmfd r13!,{loc}
4610 b     backtobasic
4620 :
4630 .op_jne
4640 mov   loc,pB
4650 bl    get
4660 cmp   B,#0
4670 beq   backtobasic
4680 ldmfd r13!,{loc}
4690 sub   loc ,pA,#1
4700 stmfd r13!,{loc}
4710 b     backtobasic
4720 :
4730 .op_djn
4740 mov   loc,pB
4750 bl    get
4760 sub   B,B,#1
4770 bl    store
4780 cmp   B,#0
4790 beq   backtobasic
4800 ldmfd r13!,{loc}
4810 sub   loc,pA,#1
4820 stmfd r13!,{loc}
4830 b     backtobasic
4840 :
4850 .op_cmp
4860 mov   dum2,mB
4870 cmp   mA ,#0
4880 beq   cmp_next1
4890 mov   loc,pA
4900 bl    get
4910 mov   pA ,B
4920 :
4930 .cmp_next1
4940 cmp   dum2,#0
4950 beq   cmp_next2
4960 mov   loc,pB
4970 bl    get
4980 mov   pB,B
4990 :
5000 .cmp_next2
5010 cmp   pA ,pB
5020 beq   backtobasic
5030 ldmfd r13!,{loc}
5040 add   loc,loc,#1
5050 stmfd r13!,{loc}
5060 b     backtobasic
5070 :
5080 .op_spl
5090 FNadr(0,plr_store)
5100 ldr   dum2,[r0,#0]
5110 FNadr(0,top_store)
5120 ldr   mA,[r0,dum2,lsl #2]
5130 cmp   mA,#maxspl
5140 beq   spl_toomanysplits
5150 add   mA,mA ,#1
5160 str   mA,[r0,dum2,lsl #2]
5170 FNadr(0,spl_store)
5180 ldr   dum,[r0,dum2,lsl #2]
5190 add   dum,dum,#1
5200 :
5210 FNadr(0,pc_table)
5220 mov   r1,#((maxplr+1)*2)
5230 .dat_loop
5240 sub   mA,mA,#1
5250 mla   A,r1,mA,r0
5260 add   A,A,dum2,lsl #1
5270 ldrb  r2,[A,#0]
5280 ldrb  Op,[A,#1]
5290 add   A,A,#((maxplr+1)*2)
5300 strb  r2,[A,#0]
5310 strb  Op,[A,#1]
5320 cmp   mA ,dum
5330 bgt   dat_loop
5340 :
5350 mla   r0,r1,dum,r0
5360 add   r0,r0,dum2,lsl #1
5370 and   mA,pA,#&00ff
5380 strb  mA,[r0,#0]
5390 mov   mA,pA,lsr #8
5400 strb  mA,[r0,#1]
5410 :
5420 b     backtobasic
5430 ;
5440 .spl_toomanysplits
5450 b     backtobasic
5460 :
5470 .op_dat
5480 FNadr(0,plr_store)
5490 ldr   dum2,[r0,#0]
5500 FNadr(0,spl_store)
5510 ldr   dum,[r0 ,dum2,lsl #2]
5520 FNadr(0,top_store)
5530 ldr   mA,[r0,dum2,lsl #2]
5540 sub   mA,mA,#1
5550 str   mA,[r0,dum2,lsl #2]
5560 add   mA,mA,#1
5570 FNadr(0,pc_table)
5580 mov   r1,#((maxplr+1)*2)
5590 :
5600 .dat_loop
5610 add   dum ,dum,#1
5620 mla   A,r1,dum,r0
5630 add   A,A,dum2,lsl #1
5640 ldrb  r2,[A,#0]
5650 ldrb  Op,[A,#1]
5660 sub   A,A,#((maxplr+1)*2)
5670 strb  r2,[A,#0]
5680 strb  Op,[A,#1]
5690 cmp   dum,mA
5700 bls   dat_loop
5710 ldmfd r13!,{loc}
5720 mvn   loc ,#0
5730 stmfd r13!,{loc}
5740 b     backtobasic
5750 :
5760 .op_unknown
5770 swi   &100+13
5780 swi   &100+10
5790 FNadr(5,plr_names)
5800 FNadr(3,plr_store)
5810 ldr   r1,[r3 ,#0]
5820 mov   r2,#16
5830 mla   r0,r1,r2,r5
5840 swi   "OS_Write0"
5850 FNadr(0 ,unknown_text1)
5860 swi   "OS_Write0"
5870 mov   r0,Op
5880 FNadr(1,string)
5890 mov   r2,#stringlen
5900 swi   "OS_BinaryToDecimal"
5910 mov   r0,r1
5920 mov   r1,#0
5930 strb  r1,[r2,#0]
5940 swi   "OS_Write0"
5950 FNadr(0,unknown_text2)
5960 swi   "OS_Write0"
5970 ldmfd r13!,{r0-r1}
5980 b     end_program
5990 :
6000 .store
6010 cmp   A,#0
6020 addlt A,A,#mem
6030 cmp   A,#mem
6040 subge A,A,#mem
6050 cmp   B,#0
6060 addlt B,B,#mem
6070 cmp   B,#mem
6080 subge B,B,#mem
6090 .mod_add_loc
6100 cmp   loc,#0
6110 addlt loc,loc,#mem
6120 BLT  mod_add_loc
6130 .mod_sub_loc
6140 cmp   loc,#mem
6150 subhi loc,loc,#mem
6160 BHI  mod_sub_loc
6170 FNadr(1,core%)
6180 mov   dum,#5
6190 mla   r1,loc,dum,r1
6200 mov   r0,Op
6210 add   r0,r0,mA,lsl #4
6220 add   r0,r0,mB,lsl #6
6230 strb  r0,[r1,#0]
6240 and   r0,A,#&00ff
6250 strb  r0,[r1,#1]!
6260 mov   r0,A,lsr #8
6270 strb  r0,[r1,#1]!
6280 and   r0,B,#&00ff
6290 strb  r0,[r1,#1]!
6300 mov   r0,B,lsr #8
6310 strb  r0,[r1,#1]!
6320 :
6330 stmfd r13!,{link}
6340 bl plot_point
6350 ldmfd r13!,{pc}
6360 .plot_point
6370 FNadr(dum,%1111111)
6380 and   r1,loc,dum
6390 mov   r2,#10
6400 mul   r1,r2,r1
6410 add   dum,r1,#6
6420 :
6430 mov   dum2,loc,lsr #7
6440 mov   r2,#12
6450 mul   dum2,r2,dum2
6460 mov   r2,#960
6470 sub   r2,r2,dum2
6480 sub   dum2,r2,#4
6490 mov   r0,#4
6500 swi   "OS_Plot"
6510 mov   r0,#101
6520 mov   r1,dum
6530 mov   r2,dum2
6540 swi   "OS_Plot"
6550 mov   pc,r14
6560 :
6570 .get
6580 :
6590 .get_add_loc
6600 cmp   loc,#0
6610 addlt loc,loc,#mem
6620 BLT get_add_loc
6630 .get_sub_loc
6640 cmp   loc,#mem
6650 subge loc,loc,#mem
6660 BHI get_sub_loc
6670 FNadr(1,core%)
6680 mov   dum,#5
6690 mla   r1,loc,dum,r1
6700 ldrb  r0,[r1,#0]
6710 and   Op,r0,#%1111
6720 and   mA,r0,#%110000
6730 and   mB,r0,#%11000000
6740 mov   mA,mA,lsr #4
6750 mov   mB,mB,lsr #6
6760 ldrb  A,[r1,#1]!
6770 ldrb  r0,[r1,#1]!
6780 add   A,A,r0,lsl #8
6790 ldrb  B,[r1,#1]!
6800 ldrb  r0,[r1,#1]!
6810 add   B,B,r0,lsl #8
6820 mov   pc,link
6830 :
6840 .escape_text
6850 equs  CHR$13+CHR$10+"Escape after
the "+CHR$(0)
6860 ALIGN
6870 :
6880 .toomany_text
6890 equs  " has too many spilts, after
the "+CHR$(0)
6900 ALIGN
6910 :
6920 .lost_text
6930 equs  " lost after the "+CHR$0
6940 ALIGN
6950 :
6960 .cycles_text
6970 equs  " cycle."+CHR$13+CHR$(10)+CH
R$13+CHR$(10)+CHR$0
6980 ALIGN
6990 :
7000 .unknown_text1
7010 equs  " executed an unknown opcode
("+CHR$(0)
7020 ALIGN
7030 :
7040 .unknown_text2
```

Instruction	Mnemonic	Argument		Function
Data	DAT	-	B	B is a data value. Non executable
Move	MOV	A	B	Copy the contents of A to the contents of B
Add	ADD	A	B	Add the contents of A to the contents of B
Subtract	SUB	A	B	Subtract the contents of A from the contents of B
Jump	JMP	A	-	Jump to statement at A
Jump if zero	JMZ	A	B	If the contents of B is not zero jump to A
Jump if not zero	JMN	A	B	jump to A
Decrement jump if not zero	DJN	A	B	Decrement the contents of B. If the contents of B is not zero,
Compare	CMP	A	B	Compare the contents of A with the contents of B. If they are equal skip the next instruction
Split	SPL	A	-	Split the execution to the next statement and the one at A



◀ Continued

```
7050 equs  ") after the "+CHR$(0)
7060 ALIGN
7070 :
7080 .plr_names
7090 equd 0:equd 0:equd 0:equd 0
7100 equd 0:equd 0:equd 0:equd 0
7110 :
7120 .old_pc
7130 equd 0
7140 :
7150 .old_top_sum
7160 equd 0
7170 :
7180 .cycles
7190 equd 0
7200 :
7210 .plr_store
7220 equd 0
7230 :
7240 .spl_store
7250 equd 0
7260 equd 0
7270 :
7280 .top_store
7290 equd 0
7300 equd 0
7310 :
7320 .col_table
7330 equb 1
7340 equb 4
7350 ALIGN
7360 :
7370 .string
7380 equs STRING$(stringlen,CHR$0)
7390 ALIGN
7400 :
7410 .pc_table
7420 ]
7430 P%+=maxspl*(maxplr+1)*2
7440 IF (pass AND 1)>0 THEN PRINT"Size:"maxspl*(maxplr+1)*2
7450 [:OPT pass
7460 ]
7470 NEXT
7480 OSCLI "Key 5 continue|MY"
7490 ENDPROC
7500 :
7510 DEF FNadr(reg%,adr%)
7520 :
7530 REM Replacement for ADR's that can't be computed
7540 :
7550 IF reg%<0 OR reg%>14 THEN ERROR 1,"No such registor in ADR macro"
7560 IF (pass AND 1)>0 PRINT'"->ADR macro"
7570 reladr%=adr%-P%-20
7580 sign%=SGN(reladr%)
7590 reladr%=ABS(reladr%)
7600 [OPTpass:MOV reg%,#(reladr% AND &FF)
7610 ADD reg%,reg%,#(reladr% AND &FF00)
7620 ADD reg%,reg%,#(reladr% AND &FF0000):]
7630 IF sign%<0 THEN
7640 [OPT pass:SUB reg%,PC,reg%:]
7650 ELSE
7660 [OPT pass:ADD reg%,PC,reg%:]
7670 ENDIF
7680 IF (pass AND 1)>0 THEN PRINT"-> R";reg%;" contains &";~adr%
7690 =""
```

Piclist

Listing 1

```
10 REM >MakeApp (PicList1)
20 REM Creates Pic-List files
30 REM by Chris Ruseman
40 REM for Archimedes only
50 REM (c) BAU May 1991
60 :
70 free%=(HIMEM-END-&8000) AND &FFFFF000
80 DIM w% free%
90 READ app$
100 REPEAT
110 PROCins(app$)
120 INPUT"Enter destination directory: "app$
130 IF app$="" app$="@"
140 SYS "XOS_File",5,app$ TO type%
150 UNTIL type%=2
160 :
170 REPEAT
180 READ file$
190 IF file$<>"*" THEN
200 file$=app$+"."+file$
210 PRINT"Creating file """file$""""
220 READ load%,exec%,olen%,attrib%
230 p%=0
240 d$=""
250 dl%=1
260 WHILE p%<olen%
270 b%=FNb
280 IF b%=130:p%?w%=FNb:p%+=1
290 IF b%>=131 AND b%<=162 THEN
300 n%=b%-128
310 f%=p%-FNb
320 FOR i%=0 TO n%-1
330 ?(w%+p%+i%)=?(w%+f%+i%)
340 NEXT
350 p%+=n%
360 ENDIF
370 IF b%<130 OR b%>162 THEN
380 p%?w%=b%:p%+=1
390 ENDIF
400 ENDWHILE
410 SYS "OS_File",0,file$,,,w%,w%+p%
420 SYS "OS_File",1,file$,load%,exec%,,attrib%
430 ENDIF
440 UNTIL file$="*"
450 PRINT'"Files created"
460 END
470 :
480 DEF FNb
490 LOCAL b%,c1%,c2%,i%
500 IF d$="" THEN
510 READ d$,c1%
520 c2%=0
530 FOR i%=1 TO LEN(d$)/2
540 c2%+=EVAL("&"+MID$(d$,2*i%-1,2))
550 NEXT
560 IF c1%<>(c2% MOD 100) PRINT"Error in DATA line ";dl%:END
570 dl%+=1
580 ENDIF
590 b%=EVAL("&"+LEFT$(d$,2))
600 d$=MID$(d$,3)
610 =b%
620 :
630 DEF PROCins(i$)
640 LOCAL i%
650 FOR i%=1 TO LEN(i$)
660 SYS "OS_Byte",138,0,ASC(MID$(i$,i%))
670 NEXT
680 ENDPROC
690 :
700 DATA $.!Pic-List
710 DATA "!Sprites"
720 DATA &FFFFF942,&FAAFB251
730 DATA &2E0,&3
740 DATA 0100000108304E4020000,82
750 DATA D483042170696320D6C6973,69
760 DATA 74831804871C8323000783,42
770 DATA 282C832C8083310C833477,81
780 DATA 777778304277277077B7,3
790 DATA BBBB0B408414831700202 2,21
800 DATA 0277072222833070843B83,9
810 DATA 142722424747700774242 2,6
820 DATA 220070678A3C8743778628,42
830 DATA 77C7CCCCCCC830484077C,32
840 DATA 875FC7CC892C8314855007,85
850 DATA C7CC0700B00B8492831474,42
860 DATA 84A4891464640483287040,4
870 DATA 873C85987070407383148 4,66
880 DATA C000853C83984740077484,58
890 DATA 6485A1C7CC828708839867,56
900 DATA 6677882840838C07800870,87
910 DATA 83F584287074872807008 2,88
920 DATA 880070040074729 6A085F0,65
930 DATA 84508CC884DC708FF10787,42
940 DATA FF07861A73840A07FFFFFF,51
950 DATA 85400000F0890A8814F0FF,35
960 DATA 0F0F830D8B148312882388,89
970 DATA 2883418344850687 0F9314,91
980 DATA A228A23CA264A28CA2B4A2,92
990 DATA C893F000008304860784 0D,8
1000 DATA FFFFFF,65
1010 DATA "Templates"
1020 DATA &FFFFEC42,&FAB07670
1030 DATA &3B7,&3
1040 DATA FFFFFFFF00000000830485,88
1050 DATA 075C830DB60100000183 15,79
1060 DATA 696E666F0D871D12020000,25
1070 DATA 44871873617665 0D3C3CC0,83
1080 DATA 038339568305618341843 0,86
1090 DATA 6D61696E0DF0003C3C831C,53
1100 DATA 84545E83348298835DDA04,21
1110 DATA 000070845187692007835 0,15
1120 DATA 0001828407020701 0C0E0C,18
1130 DATA 867FFC838805868A3D847D,75
1140 DATA 308684849C78839084A813,16
1150 DATA 83A90983ADA4838C3483B9,16
1160 DATA 5483816483C13D3000B70D,73
1170 DATA 4B0D7469746C65643E0DFE,63
1180 DATA 829A83D1CC83D97683B483,36
1190 DATA 57FF3D610007828B874414,99
1200 DATA 83ED842082988720C88720,48
1210 DATA 829487641A872084588440,22
1220 DATA 8294874 0A687842887403 0,97
1230 DATA 87606087 60B587A41E83F9,48
1240 DATA 3E83FDD083B18488F883B9,94
1250 DATA 190000174E616D653A0D86,38
1260 DATA A00E83F2829C8720C48720,63
1270 DATA 507572706F73832383C084,70
1280 DATA 446887408290874041757 4,42
1290 DATA 686F723A0D884038876084,19
1300 DATA 8084605665727369 6F6E85,31
1310 DATA 4041626F75742074686973,43
1320 DATA 2070726F6772616D0D5069,90
1330 DATA 632D4C697374 8409747572,44
1340 DATA 6520436174616C6F677565,50
1350 DATA 0DA920424155204D617920,89
1360 DATA 313939310D0DD083EA7883,62
1370 DATA EEC683FE2083E283F18405,19
1380 DATA 0024070000120003828407,33
1390 DATA 0207010C0E0C8619FCFFFF,69
1400 DATA 000586243D842B30000083,90
1410 DATA 3F853553617665206173 3A,50
1420 DATA 0D0D0D65833B00C087AEEE,69
1430 DATA 87D63D829001C74F4B0D74,67
1440 DATA 69746C6583D6F6108378B8,72
1450 DATA 83F6168378E483FE116100,77
1460 DATA 1738838C83E9FF1E83F20A,82
1470 DATA 87EEBA8840F10007438720,41
1480 DATA 84755883ABA68360829C83,49
1490 DATA B3EC83683A60001766696C,42
1500 DATA 655F666390D6F6E0D829A,88
1510 DATA 83CB0883804A83E0388480,46
1520 DATA 6000D73C556E8880E64484,60
1530 DATA CFFEFFFF483F32C93206E,22
1540 DATA 83F20C848C83E13C934046,54
1550 DATA 836C206E616D6583F2AE04,39
1560 DATA 839083D03E83F9D083D083,34
1570 DATA FF8405001883100200 01FF,21
1580 DATA 0702070003010C8619FC83,74
1590 DATA C00586243D83F000600084,27
1600 DATA CF853584D484E014874350,95
1610 DATA 69632D4C6973740D,74
1620 DATA *
```

Listing 2

```
10 REM >!RunImage (PicList2)
20 REM Picture Catalogue
30 REM by Chris Ruseman
40 REM for Archimedes only
50 REM (c) BAU May 1991
60 :
70 DIM q% &500,buffer% &100,iconinf% 40,menubuf% &400,ic% &100,q2% &500
80 DIM gcol% &100,scale% 16,pal% 80,pal4% 80,pal2% 80
90 DIM numsonly% 8
100 $numsonly%="a0-9"
110 PROCinitheap
120 $q%="TASK"
130 SYS "Wimp_Initialise",200,!q%,"Pic-List" TO version%,mytask%
140 PROCinitwindows
150 PROCinit
160 PROCsortoutmode
170 PROCmakemenus
180 piclisticon%=FNiconbar
190 PROCsetextents
200 ON ERROR PROCerrbox
210 REPEAT
220 SYS "Wimp_Poll",%110001,q% TO reason%
230 CASE reason% OF
240 WHEN 1:PROCredraw(q%)
250 WHEN 2:SYS "Wimp_OpenWindow",,q%
260 WHEN 3:PROCclosewindow(!q%)
270 WHEN 6:PROCcheckmouse(!q%,q%!4,q%!8,q%!12,q%!16,q%!20)
280 WHEN 7:PROCdrag
290 WHEN 8:PROCkey(!q%,q%!4,q%!8,q%!12,q%!16,q%!20,q%!24)
300 WHEN 9:PROCmenuselect(q%)
310 WHEN 17,18:PROCmessage
320 ENDCASE
330 UNTIL FALSE
340 END
350 :
360 DEF PROCdrag
370 SYS "Wimp_GetPointerInfo",,q%
380 q%!32=q%!4:q%!28=!q%
390 q%!24=q%!16:q%!20=q%!12
400 q%!16=1:q%!12=0
410 q%!36=!FNpage(vispage%)
420 q%!40=spritefiletype
430 $(q%+44)=FNlastbit(FNgetstr(savetext))+CHR$(0)
440 !q%=60
450 SYS "Wimp_SendMessage",17,q%,q%!20,q%!24
460 ENDPROC
470 :
480 DEF FNgetstr(a%)
490 LOCAL b$
500 WHILE ?a%>=32
510 b$+=CHR$(?a%)
520 a%+=1
530 ENDWHILE
540 =b$
550 :
560 DEF FNfirstbit(s$)
570 LOCAL i
580 i=LEN(s$)
590 WHILE MID$(s$,i,1)<>"." AND i>1
600 i-=1
610 ENDWHILE
620 =LEFT$(s$,i-1)
630 :
640 DEF FNlastbit(s$)
650 WHILE INSTR(s$,":")>0
660 s$=MID$(s$,INSTR(s$,":")+1)
670 ENDWHILE
680 WHILE INSTR(s$,".")>0
690 s$=MID$(s$,INSTR(s$,".")+1)
700 ENDWHILE
710 =s$
720 :
730 DEF PROCkey(hand%,icon%,xcar%,ycar%,carh%,carpos%,key%)
740 IF hand%=savehand% AND key%=13 THEN
750 PROCsave(FNgetstr(savetext))
760 ELSE
770 SYS "Wimp_ProcessKey",key%
780 ENDIF
790 ENDPROC
800 :
810 DEF FNtextaddr(hand%,icon%)
820 PROCgeticoninfo(hand%,icon%)
830 =iconinf%!28
840 :
850 DEF PROCgeticoninfo(hand%,icon%)
860 !iconinf%=hand%
870 iconinf%!4=icon%
880 SYS "Wimp_GetIconState",,iconinf%
890 ENDPROC
900 :
910 DEF PROCredraw(q%)
920 LOCAL object%
930 SYS "Wimp_RedrawWindow",,q% TO more%
940 WHILE more%
950 PROCextract(q%)
960 IF !q%=mainhand% SYS "OS_SpriteOp",52+256,FNpage(vispage%),"page",ax0%,ay0%-pagey%,0,scale%,gcol%
970 SYS "Wimp_GetRectangle",,q% TO more%
980 ENDWHILE
990 ENDPROC
1000 :
1010 DEF PROCupdate
1020 IF active% THEN
1030 !q2%=mainhand%
1040 q2%!4=0
1050 q2%!8=-pagey%
1060 q2%!12=pagex%
1070 q2%!16=0
1080 SYS "Wimp_UpdateWindow",,q2% TO more%
1090 WHILE more%
1100 PROCextract(q2%)
1110 SYS "OS_SpriteOp",52+256,FNpage(vispage%),"page",ax0%,ay0%-pagey%,0,scale%,gcol%
1120 SYS "Wimp_GetRectangle",,q2% TO more%
1130 ENDWHILE
1140 ENDIF
1150 ENDPROC
1160 :
1170 DEF PROCmessage
1180 LOCAL task%,ref%
1190 task%=q%!4
1200 ref%=q%!8
1210 CASE q%!16 OF
1220 WHEN 0:PROCshutdownwimp
1230 WHEN 2:
1240 PROCsave(FNgetstr(q%+44))
1250 SYS "Wimp_GetPointerInfo",,q%
1260 q%!20=q%!12
1270 q%!24=q%!16
1280 q%!28=!q%
1290 q%!32=q%!4
1300 q%!36=!FNpage(vispage%)
1310 !q%=48+((LEN(FNgetstr(q%+44))+3) AND (NOT 3))
1320 q%!40=spritefiletype
1330 PROCreply(3)
1340 WHEN 3:
1350 IF q%!12=0 THEN
1360 IF NOT active% PROCreopen
1370 SYS "Hourglass_On"
1380 PROCmainscan(FNgetstr(q%+44))
1390 SYS "Hourglass_Off"
1400 PROCtitle
1410 PROCreply(4)
1420 ENDIF
1430 WHEN &400C1:PROCsortoutmode
1440 ENDCASE
1450 ENDPROC
1460 :
1470 DEF PROCreply(reason%)
1480 q%!12=ref%
1490 q%!16=reason%
1500 SYS "Wimp_SendMessage",17,q%,task%
1510 ENDPROC
1520 :
1530 DEF PROCcheckmouse(mousex%,mousey%,b%,handle%,icon%,ob%)
1540 IF (b% AND 5)>0 THEN
1550 CASE handle% OF
1560 WHEN -2:IF active% PROCfront ELSE PROCreopen
```

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```
1570 WHEN savehand%:
1580 CASE icon% OF
1590 WHEN 0:
1600 PROCsave(FNgetstr(savetext))
1610 WHEN 3:PROCinitsavedrag(savehand%)
1620 ENDCASE
1630 ENDCASE
1640 ENDIF
1650 IF (b% AND 2)>0 THEN
1660 PROCpreparemenus
1670 CASE handle% OF
1680 WHEN -2:PROCopenmenu(quitmenu%,mousex%-64,216)
1690 WHEN mainhand%:PROCopenmenu(mainmenu%,mousex%-64,mousey%)
1700 ENDCASE
1710 ENDIF
1720 ENDPROC
1730 :
1740 DEF PROCinitsavedrag(savehand%)
1750 LOCAL x%,y%,ysize%
1760 !q%=savehand%
1770 SYS "Wimp_GetWindowState",,q%
1780 ysize%=q%!16-q%!8
1790 x%=q%!4
1800 y%=q%!8
1810 q%!4=3
1820 SYS "Wimp_GetIconState",,q%
1830 q%!8+=x%
1840 q%!12+=y%+ysize%
1850 q%!16+=x%
1860 q%!20+=y%+ysize%
1870 q%!24=0
1880 q%!28=0
1890 q%!32=swidth%
1900 q%!36=sheight%
1910 !q%=0
1920 q%!4=5
1930 SYS "Wimp_DragBox",,q%
1940 ENDPROC
1950 :
1960 DEF PROCmakemenus
1970 menuptr%=menubuf%
1980 menend%=menubuf%+&3FF
1990 gotomenu%=FNmakemen("|wri","Goto")
2000 mainmenu%=FNmakemen("|winsvSave,Next page,Last page,"+FNsub("Go to",gotomenu%)+",Clear","Pic-List")
2010 labelmenu%=FNmakemen("Path,Leaf","Label")
2020 pagemodemenu%=FNmakemen("|wri","Mode")
2030 xmenu%=FNmakemen("|wri","x size")
2040 ymenu%=FNmakemen("|wri","y size")
2050 gxmenu%=FNmakemen("|wri","Across")
2060 gymenu%=FNmakemen("|wri","Down")
2070 pagesizemenu%=FNmakemen(FNsub("x size",xmenu%)+","+FNsub("y size",ymenu%),"Page size")
2080 gridmenu%=FNmakemen(FNsub("Across",gxmenu%)+","+FNsub("Down",gymenu%),"Grid")
2090 setupmenu%=FNmakemen(FNsub("Label",labelmenu%)+","+FNsub("Page mode",pagemodemenu%)+","+FNsub("Page size",pagesizemenu%)+","+FNsub("Grid",gridmenu%)+",Auto set","Set up")
2100 quitmenu%=FNmakemen("|winidInfo,"+FNsub("Set up",setupmenu%)+",Quit","Pic-List")
2110 ENDPROC
2120 :
2130 DEF PROCpreparemenus
2140 PROClight(quitmenu%,1,NOT active%)
2150 PROClight(mainmenu%,1,vispage%<pages%-1)
2160 PROClight(mainmenu%,2,vispage%>0)
2170 PROCtick(labelmenu%,0,(label% AND 1)>0)
2180 PROCtick(labelmenu%,1,(label% AND 2)>0)
2190 PROCsetmenstr(pagemodemenu%,0,STR$(pagem%))
2200 PROCsetmenstr(xmenu%,0,STR$(pagex%))
2210 PROCsetmenstr(ymenu%,0,STR$(pagey%))
2220 PROCsetmenstr(gxmenu%,0,STR$(across%))
2230 PROCsetmenstr(gymenu%,0,STR$(down%))
2240 PROCsetmenstr(gotomenu%,0,STR$(vispage%+1))
2250 PROClight(setupmenu%,4,FNpdpres)
2260 $savetext="Page_"+STR$(vispage%+1)
2270 ENDPROC
2280 :
2290 DEF PROClight(a%,i%,c%)
2300 a%=a%+36+24*i%
2310 IF c% THEN !a%=!a% AND &FFBFFFFF ELSE !a%=!a% OR &00400000
2320 ENDPROC
2330 :
2340 DEF PROCtick(a%,i%,c%)
2350 a%=a%+28+24*i%
2360 IF c% THEN !a%=!a% OR 1 ELSE !a%=!a% AND &FFFFFFFE
2370 ENDPROC
2380 :
2390 DEF FNsub(m$,m%)="|sub"+RIGHT$("0000000"+STR$(m%),12)+m$
2400 :
2410 DEF PROCmenuitem(text$)
2420 LOCAL menuflags%,iconflags%,submenu%,indlen%,valid%
2430 valid%=-1
2440 ii%=FALSE
2450 indlen%=-1
2460 submenu%=-1
2470 IF text$="" ENDPROC
2480 menuflags%=0
2490 iconflags%=&07000021
2500 WHILE LEFT$(text$,1)="|"
2510 CASE MID$(text$,2,3) OF
2520 WHEN "sub":
2530 submenu%=VAL(MID$(text$,5,12))
2540 text$=MID$(text$,17)
2550 WHEN "win":
2560 CASE MID$(text$,5,2) OF
2570 WHEN "sv":submenu%=savehand%
2580 WHEN "id":submenu%=infohand%
2590 ENDCASE
2600 text$=MID$(text$,7)
2610 WHEN "wri":
2620 menuflags%+=%100
2630 text$=MID$(text$,5)
2640 indlen%=11
2650 valid%=numsonly%
2660 IF menumax%<6 menumax%=6
2670 ENDCASE
2680 ENDWHILE
2690 IF LEN(text$)>menumax% menumax%=LEN(text$)
2700 menuptr%!0=menuflags%
2710 menuptr%!4=submenu%
2720 menuptr%!8=iconflags%
2730 IF LEN(text$)>11 indlen%=LEN(text$)
2740 IF indlen%<0 THEN
2750 $(menuptr%+12)=text$
2760 ELSE
2770 menend%-=(indlen%+1)
2780 menuptr%!8=(menuptr%!8) OR %100000000
2790 menuptr%!12=menend%
2800 menuptr%!16=valid%
2810 menuptr%!20=indlen%
2820 $menend%=text$
2830 ENDIF
2840 menuptr%+=24
2850 ENDPROC
2860 :
2870 DEF FNpar(sep$)
2880 i1%=i%+1:i%=INSTR(menu$+sep$,sep$,i1%)
2890 =MID$(menu$,i1%,i%-i1%)
2900 :
2910 DEF FNmakemen(menu$,menutitle$)
2920 LOCAL menumax%,wasptr%
2930 wasptr%=menuptr%
2940 menumax%=0
2950 i%=0
2960 menuptr%!20=40
2970 $menuptr%=menutitle$
2980 menuptr%?12=7
2990 menuptr%?13=2
3000 menuptr%?14=7
3010 menuptr%?15=0
3020 maxaddr%=menuptr%+16
3030 menuptr%!24=0
3040 menuptr%+=28
3050 REPEAT
3060 item$=FNpar(",")
3070 PROCmenuitem(item$)
3080 UNTIL item$=""
3090 menuptr%!-24=(menuptr%!-24) OR &80
3100 !maxaddr%=menumax%*16+32
3110 =wasptr%
3120 :
3130 DEF PROCopenmenu(m%,x%,y%)
3140 menux%=x%
3150 menuy%=y%
3160 curmenu%=m%
3170 SYS "Wimp_CreateMenu",,m%,x%,y%
3180 ENDPROC
3190 :
3200 DEF FNiconbar
3210 LOCAL ii%
3220 !ic%=-1:ic%!4=0:ic%!8=0:ic%!12=64:ic%!16=68
3230 ic%!20=&7000311A
3240 DIM ic%!24 12
3250 $(ic%!24)="!pic-list"
3260 ic%!28=1
3270 ic%!32=12
3280 SYS "Wimp_CreateIcon",,ic% TO ii%
3290 =ii%
3300 :
3310 DEF PROCmenuselect(menus%)
3320 LOCAL redo%
3330 SYS "Wimp_GetPointerInfo",,q2%
3340 redo%=(((q2%!8) AND 1)>0)
3350 CASE curmenu% OF
3360 WHEN quitmenu%:PROCdecodequitmenu
3370 WHEN mainmenu%:PROCdecodemainmenu
3380 ENDCASE
3390 IF redo% PROCpreparemenus:PROCopenmenu(curmenu%,menux%,menuy%)
3400 ENDPROC
3410 :
3420 DEF PROCdecodequitmenu
3430 CASE !menus% OF
3440 WHEN 1:
3450 CASE menus%!4 OF
3460 WHEN 0:IF menus%!8>=0 THEN label%=label% EOR (1<<(menus%!8))
3470 WHEN 1:
3480 m%=FNmenval(pagemodemenu%,0)
3490 IF m%>=0 AND m%<=127 THEN
3500 SYS "OS_CheckModeValid",m% TO ex%;ok%
3510 IF (ok% AND 2)=0 OR ex%=-2 THEN
3520 IF (FNone_modishy_value(m%,0) AND 1)=0 pagem%=m%
3530 ENDIF
3540 ENDIF
3550 WHEN 2:
3560 m%=FNmenval(xmenu%,0)
3570 IF m%>=128 AND m%<9999 THEN pagex%=m%
3580 m%=FNmenval(ymenu%,0)
3590 IF m%>=128 AND m%<9999 THEN pagey%=m%
3600 WHEN 3:
3610 m%=FNmenval(gxmenu%,0)
3620 IF m%>=1 AND m%<99 THEN across%=m%
3630 m%=FNmenval(gymenu%,0)
3640 IF m%>=1 AND m%<99 THEN down%=m%
3650 WHEN 4:
3660 PROCautoset
3670 ENDCASE
3680 WHEN 2:PROCshutdownwimp
3690 ENDCASE
3700 ENDPROC
3710 :
3720 DEF PROCautoset
3730 SYS "PDriver_PageSize" TO ,,,left,bottom,right,top
3740 pagex%=(right-left)/400-32
3750 pagey%=ABS(top-bottom)/400-32
3760 across%=pagex% DIV 200
3770 down%=pagey% DIV 160
3780 ENDPROC
3790 :
3800 DEF PROCdecodemainmenu
3810 CASE !menus% OF
3820 WHEN 1:vispage%+=1:PROCtitle
3830 WHEN 2:vispage%-=1:PROCtitle
3840 WHEN 3:
3850 m%=FNmenval(gotomenu%,0)-1
3860 IF m%>=0 AND m%<=pages%-1 vispage%=m%:PROCtitle
3870 WHEN 4:PROCreset:PROCupdate
3880 ENDCASE
3890 ENDPROC
3900 :
3910 DEF PROCshutdownwimp
3920 $q%="TASK"
3930 SYS "Wimp_CloseDown",mytask%,!q%
3940 END
3950 ENDPROC
3960 :
3970 DEF PROCfront
3980 !q2%=mainhand%
3990 SYS "Wimp_GetWindowState",,q2%
4000 q2%!28=-1
4010 SYS "Wimp_OpenWindow",,q2%
4020 ENDPROC
4030 :
4040 DEF PROCreopen
4050 PROCreset
4060 PROCsetextents
4070 !q2%=mainhand%:q2%!28=-1
4080 q2%!4=200:q2%!8=300
4090 q2%!12=700:q2%!16=800
4100 q2%!20=0:q2%!24=0
4110 SYS "Wimp_OpenWindow",,q2%
4120 active%=TRUE
4130 ENDPROC
4140 :
4150 DEF FNcreatewindow(name$)
4160 LOCAL hand%
4170 SYS "Wimp_LoadTemplate",,templates%,ind%,indir%+&1FFF,-1,name$,0 TO ,,ind%
4180 templates%!68=10+(10<<16)
4190 SYS "Wimp_CreateWindow",,templates% TO hand%
4200 =hand%
4210 :
4220 DEF PROCclosewindow(hand%)
4230 !q%=hand%
4240 SYS "Wimp_CloseWindow",,q%
4250 IF hand%=mainhand% active%=FALSE:PROCreset
4260 ENDPROC
4270 :
4280 DEF PROCextract(q%)
4290 ax0%=q%!4-q%!20
4300 ay0%=q%!16-q%!24
4310 ENDPROC
4320 :
4330 DEF PROCsave(f$)
4340 LOCAL a%
4350 IF FNgoodsavename(f$) THEN
4360 a%=FNpage(vispage%)
4370 SYS "OS_File",10,f$,spritefiletype,,a%+4,a%+!a%
4380 PROCclosemenu
4390 ENDIF
4400 ENDPROC
4410 :
4420 DEF FNgoodsavename(f$)
4430 LOCAL ok%
4440 IF f$="<Wimp$Scrap>" OR f$="<Printer$Scrap>" THEN =TRUE
4450 ok%=(INSTR(f$,".")>0 OR INSTR(f$,":")>0)
4460 IF NOT ok% THEN
4470 PROCtellthemoff("To save, please drag the save icon to a directory viewer")
4480 PROCopenmenu(curmenu%,menux%,menuy%)
4490 ENDIF
4500 =ok%
4510 :
4520 DEF PROCtellthemoff(t$)
4530 !buffer%=0
4540 $(buffer%+4)=t$+CHR$(0)
4550 SYS "Wimp_ReportError",buffer%,1,"Pic-List"
4560 ENDPROC
4570 :
4580 DEF PROCerrbox
4590 LOCAL what%
4600 SYS "Wimp_DragBox",,-1
4610 !buffer%=ERR
4620 $(buffer%+4)=REPORT$+" / "+STR$ERL+CHR$0
4630 SYS "Wimp_ReportError",buffer%,3,"Pic-List" TO ,what%
4640 IF what%=2 PROCshutdownwimp
4650 ENDPROC
4660 :
4670 DEF PROCinitwindows
4680 DIM templates% &800,indir% &800
4690 ind%=indir%
4700 SYS "Wimp_OpenTemplate",,"<Pic-List$Dir>.Templates"
4710 mainhand%=FNcreatewindow("Main")
4720 savehand%=FNcreatewindow("Save")
4730 infohand%=FNcreatewindow("Info")
4740 SYS "Wimp_CloseTemplate"
4750 savetext=FNtextaddr(savehand%,2)
4760 $savetext="Page"
4770 $FNtextaddr(infohand%,4)="0.90 (27th Feb 1991)"
4780 ENDPROC
4790 :
4800 DEF PROCclosemenu
4810 SYS "Wimp_CreateMenu",,-1
4820 ENDPROC
4830 :
4840 DEF PROCsetextents
4850 !q2%=0:q2%!4=-pagey%-12
4860 q2%!8=pagex%:q2%!12=0
4870 SYS "Wimp_SetExtent",mainhand%,q2%
4880 ENDPROC
4890 :
4900 DEF PROCinitheap
4910 SYS "Wimp_SlotSize",-1,-1 TO appsize%
4920 heapd%=HIMEM
4930 PROCresetheap
4940 ENDPROC
4950 :
4960 DEF PROCresetheap
4970 heapsize%=32*1024
4980 SYS "Wimp_SlotSize",appsize%+heapsize%,-1
4990 SYS "OS_Heap",0,heapd%,,heapsize%
5000 ENDPROC
5010 :
5020 DEF FNgetablock(size%)
5030 LOCAL loc%,ok%,heapfull%,largest%
5040 heapfull%=FALSE
5050 REPEAT
5060 SYS "OS_Heap",1,heapd% TO ,,largest%
5070 IF largest%>=size% THEN
5080 SYS "OS_Heap",2,heapd%,,size% TO ,,loc%
5090 ok%=TRUE
5100 ELSE
5110 heaful1%=FNtryt oextendheap
5120 ENDIF
5130 UNTIL ok% OR heapfull%
5140 IF heapfull% THEN ERROR 17,"Pic-List has run out of memory"
5150 =loc%
5160 :
5170 DEF FNextendablock(loc%,size%)
5180 LOCAL ok%,heapfull%,newloc%
5190 IF loc%<=0 THEN=FNgetablock(size%)
5200 heapfull%=FALSE
5210 REPEAT
5220 SYS "XOS_Heap",4,heapd%,loc%,size% TO ,,newloc%;ok%
5230 ok%=((ok% AND 1)=0)
5240 IF NOT ok% THEN heapfull%=FNtryt oextendheap
5250 UNTIL ok% OR heapfull%
5260 IF heapfull% THEN ERROR 17,"Pic-List has run out of memory"
5270 =newloc%
5280 :
5290 DEF FNtrytoextendheap
5300 LOCAL heapfull%,new%
5310 SYS "XWimp_SlotSize",appsize%+heapsize%+32*1024,-1 TO new%;heapfull%
5320 heapfull%=((heapfull% AND 1)=1)
5330 IF new%=appsize%+heapsize% THEN heapfull%=TRUE
5340 IF NOT heapfull% THEN
5350 heapsize%+=32*1024
5360 SYS "OS_Heap",5,heapd%,,32*1024
5370 ENDIF
5380 =heapfull%
5390 :
5400 DEF PROCfreeablock(RETURN loc%)
5410 IF loc%>0 THEN SYS "OS_Heap",3,heapd%,loc%
5420 loc%=-1
5430 ENDPROC
5440 :
5450 DEF PROCinit
5460 DIM mat 6*4,caps 4*4
5470 DIM pres% &300
5480 DIM font$(255)
5490 dft=&FFFAFF00
5500 pagex%=960
5510 pagey%=960
5520 pagem%=8
```

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```
5530 across%=4
5540 down%=4
5550 active%=FALSE
5560 label%=2
5570 PROCreset
5580 drawfiletype=&AFF
5590 dft=&FFFAFF00
5600 spritefiletype=&FF9
5610 sft=&FFFFF900
5620 IF FNpdpres PROCautoset
5630 SYS "Wimp_ReadPalette",,pal%
5640 FOR i%=0 TO 1
5650 pal2%!(4*(1-i%))=(&F0F0F0*i%)<<8
5660 NEXT
5670 FOR i%=0 TO 3
5680 pal4%!(4*(3-i%))=(&505050*i%)<<8
5690 NEXT
5700 ENDPROC
5710 :
5720 DEF PROCreset
5730 PROCresetheap
5740 boxes%=across%*down%
5750 boxx=pagex%/across%
5760 boxy=pagey%/down%
5770 rboxy=boxy-40*(label% AND 1)-20*(label% AND 2)-8
5780 rboxx=boxx-8
5790 curbox%=0
5800 pagelist%=FNgetablock(4)
5810 pages%=1
5820 curpage%=0
5830 vispage%=0
5840 !pagelist%=FNmakesprite(pagem%,pagex%,pagey%)
5850 charw%=8<<FNone_modishy_value(pagem%,4)
5860 maxlab%=boxx/charw%-1
5870 PROCsortoutmode
5880 PROCtitle
5890 ENDPROC
5900 :
5910 DEF PROCnewpagecheck
5920 IF curbox%=across%*down% THEN
5930 pagelist%=FNextendablock(pagelist%,4)
5940 pages%+=1
5950 curpage%+=1
5960 curbox%=0
5970 !(pagelist%+4*curpage%)=FNmakesprite(pagem%,pagex%,pagey%)
5980 ENDIF
5990 ENDPROC
6000 :
6010 DEF FNmakesprite(mode%,x%,y%)
6020 LOCAL s%,ss%,xp%,yp%,i%
6030 xp%=x%>>FNone_modishy_value(mode%,4)
6040 yp%=y%>>FNone_modishy_value(mode%,5)
6050 ss%=&40+yp%*((xp%*(1<<FNone_modishy_value(mode%,9))/8+3) AND (NOT 3))
6060 s%=FNgetablock(ss%)
6070 !s%=ss%
6080 s%!4=0
6090 s%!8=16
6100 s%!12=16
6110 SYS "OS_SpriteOp",15+256,s%,"page",0,xp%,yp%,mode%
6120 !pres%=0
6130 SYS "OS_SpriteOp",60+256,s%,"page",pres% TO r0%,r1%,r2%,r3%
6140 PROCdrawcol(&F0F0F000)
6150 RECTANGLE FILL 0,0,pagex%+8,pagey%+8
6160 PROCdrawcol(0)
6170 FOR i%=1 TO down%-1
6180 LINE 0,pagey%-boxy*i%-8,pagex%,pagey%-boxy*i%-8
6190 NEXT
6200 SYS "OS_SpriteOp",r0%,r1%,r2%,r3%
6210 =s%
6220 :
6230 DEF PROCsortoutmode
6240 PROCtables(MODE,FNwpal(MODE),FNpage(curpage%),"page",scale%,gcol%,1,1)
6250 swidth%=(1+FNone_modishy_value(MODE,11))<<FNone_modishy_value(MODE,4)
6260 sheight%=(1+FNone_modishy_value(MODE,12))<<FNone_modishy_value(MODE,5)
6270 ENDPROC
6280 :
6290 DEF PROCtables(dmode%,dpal%,spbase%,sp$,scale%,gcol%,zx,zy)
6300 LOCAL xres1%,yres1%,xres2%,yres2%
6310 LOCAL width%,height%,spmode%,spal%,saddr%
6320 SYS "OS_SpriteOp",40+256,spbase%,sp$ TO ,,,width%,height%,,spmode%
6330 SYS "OS_SpriteOp",24+256,spbase%,sp$ TO ,,saddr%
6340 xres1%=1<<FNone_modishy_value(spmode%,4)
6350 yres1%=1<<FNone_modishy_value(spmode%,5)
6360 xres2%=1<<FNone_modishy_value(dmode%,4)
6370 yres2%=1<<FNone_modishy_value(dmode%,5)
6380 IF saddr%!32<>44 THEN spal%=saddr%+44 ELSE spal%=FNwpal(spmode%)
6390 SYS "ColourTrans_SelectTable",spmode%,spal%,dmode%,dpal%,gcol%
6400 !scale%=xres1%*zx*256
6410 scale%!4=yres1%*zy*256
6420 scale%!8=xres2%*256
6430 scale%!12=yres2%*256
6440 ENDPROC
6450 :
6460 DEF PROCmainscan(f$)
6470 LOCAL ERROR
6480 ON ERROR LOCAL RESTORE ERROR:ENDPROC
6490 PROCscan(f$)
6500 RESTORE ERROR
6510 ENDPROC
6520 :
6530 DEF PROCscan(f$)
6540 LOCAL i%,read%,type%,ftype%
6550 IF INKEY-113 ERROR 17,"Escape"
6560 SYS "XOS_File",5,f$ TO type%,,ftype%
6570 IF type%=1 THEN
6580 IF (ftype% AND &FFFFFF00)=dft PROCdf(f$):vispage%=curpage%
6590 IF (ftype% AND &FFFFFF00)=sft PROCsf(f$):vispage%=curpage%
6600 ELSE
6610 IF type%=2 THEN
6620 i%=0
6630 REPEAT
6640 SYS "OS_GBPB",11,f$,q2%,1,i%,&100,"*" TO ,,,read%,i%
6650 IF read%=1 PROCscan(f$+"."+FNgetstr(q2%+29))
6660 UNTIL i%=-1
6670 ENDIF
6680 ENDIF
6690 ENDPROC
6700 :
6710 DEF PROCdf(f$)
6720 LOCAL block%
6730 PROCnewpagecheck
6740 SYS "OS_File",5,f$ TO ,,,,ext
6750 block%=FNgetablock(ext)
6760 points=FNgetablock(ext)
6770 SYS "OS_File",255,f$,block%
6780 !points=0
6790 base=block%
6800 ptr=24
6810 PROCgetbox(xlo,ylo,xhi,yhi)
6820 !pres%=0
6830 SYS "OS_SpriteOp",60+256,FNpage(curpage%),"page",pres% TO r0%,r1%,r2%,r3%
6840 rwidth=(xhi-xlo) DIV 256
6850 rheight=(yhi-ylo) DIV 256
6860 zoomx=rboxx/rwidth
6870 zoomy=rboxy/rheight
6880 IF zoomx<zoomy zoomy=zoomx ELSE zoomx=zoomy
6890 IF zoomx>1 zoomx=1:zoomy=1
6900 xbord=(boxx-zoomx*rwidth)/2
6910 ybord=(rboxy+8-zoomy*rheight)/2
6920 PROCdraw(block%,xbord+boxx*(curbox% MOD across%),ybord+pagey%-boxy*(curbox% DIV across%+1),ext)
6930 PROClabel(FNfirstbit(f$),FNlastbit(f$))
6940 SYS "OS_SpriteOp",r0%,r1%,r2%,r3%
6950 curbox%+=1
6960 PROCfreeablock(block%)
6970 PROCfreeablock(points)
6980 ENDPROC
6990 :
7000 DEF PROClabel(l1$,l2$)
7010 VDU 5
7020 VDU 23,17,7,6,8;8|
7030 PROCdrawcol(0)
7040 IF (label% AND 1)>0 THEN
7050 IF LEN(l1$)>maxlab% l1$="..."+RIGHT$(l1$,maxlab%-3)
7060 MOVE boxx*(curbox% MOD across%)+boxx/2-LEN(l1$)*charw%/2,pagey%-boxy*(curbox% DIV across%)-16
7070 PRINT l1$;
7080 ENDIF
7090 IF (label% AND 2)>0 THEN
7100 IF LEN(l2$)>maxlab% l1$="..."+RIGHT$(l2$,maxlab%-3)
7110 MOVE boxx*(curbox% MOD across%)+boxx/2-LEN(l2$)*charw%/2,pagey%-boxy*(curbox% DIV across%)-16+40*((label% AND 1)>0)
7120 PRINT l2$;
7130 ENDIF
7140 ENDPROC
7150 :
7160 DEF PROCsf(f$)
7170 LOCAL block%,scale%,gcol%,swidth%,sheight%,ext
7180 SYS "OS_File",5,f$ TO ,,,,ext
7190 ext+=4
7200 block%=FNgetablock(ext)
7210 scale%=FNgetablock(16)
7220 gcol%=FNgetablock(&100)
7230 !block%=ext
7240 SYS "OS_File",255,f$,block%+4
7250 IF block%!4>0 THEN
7260 FOR sp%=1 TO block%!4
7270 PROCnewpagecheck
7280 !pres%=0
7290 SYS "OS_SpriteOp",60+256,FNpage(curpage%),"page",pres% TO r0%,r1%,r2%,r3%
7300 SYS "OS_SpriteOp",13+256,block%,q2%,&100,sp%
7310 SYS "OS_SpriteOp",40+256,block%,q2% TO ,,,swidth%,sheight%,,spmode%
7320 rwidth=swidth%<<FNone_modishy_value(spmode%,4)
7330 rheight=sheight%<<FNone_modishy_value(spmode%,5)
7340 zoomx=rboxx/rwidth
7350 zoomy=rboxy/rheight
7360 IF zoomx<zoomy zoomy=zoomx ELSE zoomx=zoomy
7370 IF zoomx>1 zoomx=1:zoomy=1
7380 xbord=(boxx-zoomx*rwidth)/2
7390 ybord=(rboxy+8-zoomy*rheight)/2
7400 PROCtables(pagem%,FNwpal(pagem%),block%,FNgetstr(q2%),scale%,gcol%,zoomx,zoomy)
7410 SYS "OS_SpriteOp",52+256,block%,q2%,xbord+boxx*(curbox% MOD across%),ybord+pagey%-boxy*(curbox% DIV across%+1),8,scale%,gcol%
7420 PROClabel(f$,FNgetstr(q2%))
7430 SYS "OS_SpriteOp",r0%,r1%,r2%,r3%
7440 curbox%+=1
7450 NEXT
7460 ENDIF
7470 PROCfreeablock(block%)
7480 PROCfreeablock(scale%)
7490 PROCfreeablock(gcol%)
7500 ENDPROC
7510 :
7520 DEF PROCdraw(base,xpos,ypos,ext)
7530 LOCAL i%,ptr,paths
7540 paths=0
7550 ptr=0
7560 PROCfileheader(base,ptr,xpos,ypos)
7570 REPEAT
7580 PROCobject
7590 UNTIL ptr=ext
7600 ENDPROC
7610 :
7620 DEF PROCfileheader(base,RETURN ptr,xpos,ypos)
7630 Draw$=FNnstring(4)
7640 major=FNword
7650 minor=FNword
7660 id$=FNnstring(12)
7670 PROCgetbox(xlo,ylo,xhi,yhi)
7680 mscale=&10000*zoomx
7690 scale=mscale/&10000
7700 mat!0=mscale:mat!4=0
7710 mat!8=0:mat!12=mscale
7720 mat!16=xpos*&100-xlo*scale
7730 mat!20=ypos*&100-ylo*scale
7740 ENDPROC
7750 :
7760 DEF PROCobject
7770 LOCAL type,size,xlo,ylo,xhi,yhi
7780 type=FNword
7790 size=FNword
7800 IF type<>0 AND type<>7 PROCgetbox(xlo,ylo,xhi,yhi)
7810 CASE type OF
7820 WHEN 0:PROCfonttable
7830 WHEN 1:PROCtext
7840 WHEN 2:PROCpath
7850 WHEN 5:PROCskipobj
7860 WHEN 6:PROCgroup
7870 WHEN 7:PROCtagged
7880 WHEN 9:PROCskipobj
7890 WHEN 10:PROCskipobj
7900 OTHERWISE:ERROR 0,"Unknown Draw object"
7910 ENDCASE
7920 ENDPROC
7930 :
7940 DEF PROCskipobj
7950 IF type=0 ptr+=(size-2*4) ELSE ptr+=(size-6*4)
7960 ENDPROC
7970 :
7980 DEF PROCfonttable
7990 font$()=""
8000 pathend=ptr-2*4+size
8010 fonts%=0
8020 REPEAT
8030 fontnum%=FNbyte
8040 font$(fontnum%)=FNstring
8050 UNTIL ptr=pathend
8060 ENDPROC
8070 :
8080 DEF PROCtext
8090 pathend=ptr-6*4+size
8100 REPEAT
8110 colour%=FNword
8120 backhint%=FNword
8130 font%=FNword AND &FF
8140 xsize%=FNword
8150 ysize%=FNword
8160 xbase%=FNword
8170 ybase%=FNword
8180 text$=FNstring
8190 IF font%=0 OR font$(font%)="" THEN
8200 VDU 5
8210 VDU 23,17,7,6,xsize%*zoomx DIV 512;ysize%*zoomy DIV 1024|
8220 MOVE (mat!16+xbase%*zoomx)/256,(mat!20+ybase%*zoomy)/256+32*zoomy
8230 PRINT text$
8240 ELSE
8250 IF FN256(pagem%) THEN
8260 SYS "ColourTrans_ReturnColourNumberForMode",backhint%,pagem%,0 TO ?q2%
8270 SYS "ColourTrans_ReturnColourNumberForMode",colour%,pagem%,0 TO q2%?1
8280 SYS "Font_SetFontColours",,,q2%,0
8290 ELSE
8300 SYS "Font_SetFontColours",,FNpalent(backhint%),FNpalent(colour%),0
8310 ENDIF
8320 SYS "Font_FindFont",,font$(font%),xsize%*zoomx*16/640,ysize%*zoomy*16/640 TO fonthand%;ok%
8330 IF (ok% AND 1)=0 THEN
8340 SYS "Font_SetFont",fonthand%
8350 SYS "Font_Paint",,text$,16,(mat!16+xbase%*zoomx)/256,(mat!20+ybase%*zoomy)/256
8360 SYS "Font_LoseFont",fonthand%
8370 ENDIF
8380 ENDIF
8390 UNTIL ptr=pathend
8400 ENDPROC
8410 :
8420 DEF PROCpath
8430 pathend=ptr-6*4+size
8440 fillcol=FNword
8450 linecol=FNword
8460 linewidth=FNword
8470 linestyle=FNword
8480 dash=FNdashpat
8490 caps?0=(linestyle AND %000011)
8500 caps?1=(linestyle AND %001100)>>2
8510 caps?2=(linestyle AND %110000)>>4
8520 caps?3=0
8530 caps!4=10*&10000
8540 tricapw=(linestyle>>16) AND &FF
8550 tricapl=(linestyle>>24) AND &FF
8560 tricap=((tricapl/16*&100)<<16)+(tricapw/16*&100)
8570 caps!8=tricap
8580 caps!12=tricap
8590 IF linestyle AND 64 THEN style=2 ELSE style=0
8600 points!(paths+0)=ptr
8610 points!(paths+4)=0
8620 paths+=4
8630 IF fillcol<>-1 THEN
8640 PROCdrawcol(fillcol)
8650 SYS "Draw_Fill",base+ptr,style OR %110000,mat,0
8660 ENDIF
8670 IF linecol<>-1 THEN
8680 PROCdrawcol(linecol)
8690 IF linewidth=0 THEN lstyle=style OR %011000 ELSE lstyle=style OR %111000
8700 SYS "Draw_Stroke",base+ptr,lstyle,mat,0,linewidth,caps,dash
8710 ENDIF
8720 ptr=pathend
8730 ENDPROC
8740 :
8750 DEF PROCdrawcol(col)
8760 LOCAL gcol%
8770 SYS "ColourTrans_ReturnGCOLForMode",col,pagem%,FNwpal(pagem%) TO gcol%
8780 IF FN256(pagem%) GCOL (gcol% DIV 4) TINT (gcol% AND 3)<<6 ELSE GCOL gcol%
8790 ENDPROC
8800 :
8810 DEF FNpalent(col)
8820 LOCAL gcol%
8830 SYS "ColourTrans_ReturnGCOLForMode",col,pagem%,pal% TO gcol%
8840 =gcol%
8850 :
8860 DEF FNwpal(mode%)
8870 LOCAL p%
8880 CASE FNone_modishy_value(mode%,3) OF
8890 WHEN 63:p%=0
8900 WHEN 15:p%=pal%
8910 WHEN 3:p%=pal4%
8920 WHEN 1:p%=pal2%
8930 ENDCASE
8940 =p%
8950 :
8960 DEF FNdashpat
8970 IF linestyle AND 128 THEN
8980 dash=base+ptr
8990 dashoff=FNword
9000 dashnum=FNword
9010 ptr+=dashnum*4
9020 ELSE
9030 dash=0
9040 ENDIF
9050 =dash
9060 :
9070 DEF PROCgroup
9080 LOCAL end
9090 name$=FNnstring(12)
9100 end=ptr-12-6*4+size
9110 REPEAT
9120 PROCobject
9130 UNTIL ptr=end
9140 ENDPROC
9150 :
9160 DEF PROCtagged
9170 ident=FNword
9180 PROCobject
9190 ENDPROC
9200 :
9210 DEF FNstring
9220 LOCAL w$,c
9230 w$=""
9240 REPEAT
9250 c=FNbyte
```

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```
 9260 IF c>=32 w$+=CHR$(c)
 9270 UNTIL c<32
 9280 WHILE ptr MOD 4<>Ø
 9290 ptr+=1
 9300 ENDWHILE
 9310 =w$
 9320 :
 9330 DEF FNnstring(letters)
 9340 LOCAL w$
 9350 w$=""
 9360 FOR i=1 TO letters
 9370 w$+=FNchar
 9380 NEXT
 9390 =w$
 9400 :
 9410 DEF PROCgetbox(RETURN xl,RETURN yl
,RETURN xh,RETURN yh)
 9420 xl=FNword:yl=FNword
 9430 xh=FNword:yh=FNword
 9440 ENDPROC
 9450 :
 9460 DEF FNchar
 9470 =CHR$FNbyte
 9480 :
 9490 DEF FNbyte
 9500 LOCAL byte
 9510 byte=base?ptr
 9520 ptr+=1
 9530 =byte
 9540 :
 9550 DEF FNword
 9560 word=base!ptr
 9570 ptr+=4
 9580 =word
 9590 :
 9600 DEF FNpage(p%)
 9610 =pagelist%!(4*p%)
 9620 :
 9630 DEF FNone_modishy_value(m%,n%)
 9640 SYS "OS_ReadModeVariable",m%,n% TO
,,m%
 9650 =m%
 9660 :
 9670 DEF FN256(m%)
 9680 =FNone_modishy_value(m%,3)=63
 9690 :
 9700 DEF PROCsetmenstr(menu%,item%,s$)
 9710 $(!(menu%+28+24*item%+12))=s$
 9720 ENDPROC
 9730 :
 9740 DEF FNmenstr(menu%,item%)
 9750 =FNgetstr(!(menu%+28+24*item%+12))
 9760 :
 9770 DEF FNmenval(menu%,item%)
 9780 =VAL(FNmenstr(menu%,item%))
 9790 :
 9800 DEF PROCtitle
 9810 !q2%=mainhand%
 9820 SYS "Wimp_GetWindowInfo",,q2%
 9830 $(q2%!76)="Pic-List "+STR$(vispage
%+1)
 9840 IF active% THEN
 9850 SYS "Wimp_GetWindowState",,q2%
 9860 SYS "Wimp_CloseWindow",,q2%
 9870 SYS "Wimp_OpenWindow",,q2%
 9880 ENDIF
 9890 ENDPROC
 9900 :
 9910 DEF FNpdpres
 9920 SYS "XOS_SWINumberFromString",,"PD
river_PageSize" TO ;ok%
 9930 =(ok% AND 1)=Ø
```

Pieces of Eight

Listing 1

```
   10 REM Hints & Tips Listing 1
   20 REM View Printer Driver Generator
   30 REM by Martin Phillips
   40 REM For BBC B/B+/M/C/E
   50 REM (c) BAU May 1991
   60 :
   70 MODE 1
   80 PROCinit
   90 PROCrun
  100 MODE 7
  110 END
  120 :
  130 DEF PROCinit
  140 @%=Ø
  150 DIM cli 30
  160 VDU 19,Ø,4,Ø,Ø,Ø
  170 VDU 19,2,6,Ø,Ø,Ø
  180 code%=&900
  190 C%=code%+&100
  200 FOR N%=Ø TO 13
  210 $(C%+12*N%)=""
  220 NEXT
  230 FOR N%=Ø TO 17
  240 tot%=Ø
  250 FOR I%=Ø TO 7
  260 READ a$
  270 a$="&"+a$
  280 val%=EVAL a$
  290 code%?(N%*8+I%)=val%
  300 tot%=tot%+val%
  310 NEXT I%
  320 READ a$
  330 a$="&"+a$
  340 IF EVAL a$<>tot% THEN PRINT "Error
 at DATA line ";N%+1:END
  350 NEXT N%
  360 FOR N%=&8A TO &FF
  370 code%?N%=&FF:NEXT N%
  380 ENDPROC
  390 :
  400 DEF PROCrun
  410 PROCshow
  420 VDU 26,28,Ø,31,39,19
  430 COLOUR 131
  440 CLS
  450 COLOUR Ø
  460 PRINT '"   E..Edit      L..Load
 S..Save"
  470 PRINT "   £..Pound     Q..Quit
P..Print"
  480 VDU 28,Ø,31,39,23
  490 COLOUR 130
  500 CLS
  510 REPEAT
  520 CLS
  530 COLOUR Ø
  540 PRINT '"Enter command: ";
  550 G$=CHR$(GET AND 95)
  560 PRINT G$'
  570 IF G$="E" THEN PROCedit
  580 IF G$="L" THEN PROCload
  590 IF G$="S" THEN PROCsave
  600 IF G$="@" THEN PROCpound
  610 IF G$="Q" THEN PROCquit
  620 IF G$="P" THEN PROCprint
  630 UNTIL G$="Q"
  640 ENDPROC
  650 :
  660 DEF PROCshow
  670 VDU 26,28,Ø,18,39,Ø,17,128,12
  680 COLOUR 128
  690 COLOUR 3
  700 PRINT "      View Printer Driver Ge
nerator"'
  710 COLOUR 1
  720 PRINT TAB(1Ø) "ON";
  730 COLOUR 2
  740 PRINT TAB(2Ø) "OFF"'
  750 COLOUR 3
  760 FOR N%=Ø TO 13
  770 PRINT CHR$(64+N%);"/";CHR$(8Ø+N%);
  780 COLOUR 1
  790 PRINT "  ";
  800 FOR I%=1 TO 3
  810 A%=code%?(&8A+I%+N%*8)
  820 IF A%<255 AND I%=1 THEN PRINT ;A%;
  830 IF A%<255 AND I%>1 THEN PRINT ",";
A%;
  840 NEXT I%
  850 COLOUR 2
  860 PRINT SPC(17-POS);
  870 FOR I%=5 TO 7
  880 A%=code%?(&8A+I%+N%*8)
  890 IF A%<255 AND I%=5 THEN PRINT A%;
  900 IF A%<255 AND I%>5 THEN PRINT ",";
A%;
  910 NEXT I%
  920 COLOUR 3
  930 PRINT SPC(28-POS);
  940 PRINT $(C%+N%*12)
  950 NEXT N%
  960 VDU 26,28,Ø,31,39,23
  970 COLOUR 130
  980 ENDPROC
  990 :
 1000 DEF PROCedit
 1010 PRINT "Edit which code? ";
 1020 C$=CHR$(GET AND 79)
 1030 T%=ASC(C$)-64
 1040 CLS
 1050 PRINT "Editing code "C$
 1060 PRINT "Enter a number or press RET
URN to end"
 1070 PRINT "Enter start code: ";:PROCco
de(Ø)
 1080 PRINT "Enter end code: ";:PROCcode
(4)
 1090 INPUT "Enter comment: "com$
 1100 $(C%+12*T%)=LEFT$(com$,11)
 1110 PROCshow
 1120 ENDPROC
 1130 :
 1140 DEF PROCload
 1150 REPEAT
 1160 INPUT "Enter filename: " name$
 1170 name$=LEFT$(name$,7)
 1180 ch%=OPENUP ("P."+name$)
 1190 CLOSE# ch%
 1200 IF ch%=Ø THEN VDU 7:PRINT "No such
 driver"
 1210 UNTIL ch%<>Ø
 1220 PROCoscli("LOAD P."+name$+" 9ØØ")
 1230 PROCshow
 1240 ENDPROC
 1250 :
 1260 DEF PROCsave
 1270 INPUT "Enter filename: "name$
 1280 name$=LEFT$(name$,7)
 1290 PROCoscli("SAVE "+name$+" 9ØØ +FF
4ØØ")
 1300 PROCoscli("SAVE P."+name$+" 9ØØ +1
FF")
 1310 ENDPROC
 1320 :
 1330 DEF PROCpound
 1340 INPUT "Enter ASCII code for £: " p
%
 1350 code%?&4C=p%
 1360 ENDPROC
 1370 :
 1380 DEF PROCquit
 1390 PRINT "Are you sure? ";
 1400 g$=CHR$(GET AND 95)
 1410 IF g$<>"Y" THEN G$=""
 1420 ENDPROC
 1430 :
 1440 DEF PROCprint
 1450 VDU 2
 1460 PROCshow
 1470 VDU 3
 1480 ENDPROC
 1490 :
 1500 DEF PROCoscli($cli)
 1510 X%=cli MOD 256
 1520 Y%=cli DIV 256
 1530 CALL &FFF7
 1540 ENDPROC
 1550 :
 1560 DEF PROCcode(c)
 1570 code%!(&8A+T%*8+c)=&FFFFFFFF
 1580 INPUT LINE n$
 1590 I%=c
 1600 REPEAT
 1610 I%=I%+1
 1620 code%?(&8A+T%*8+I%)=VAL(n$)
 1630 x=INSTR(n$,",")
 1640 n$=MID$(n$,x+1)
 1650 UNTIL x=Ø
 1660 code%?(&8A+T%*8+c)=I%-c
 1670 IF (I%=c+1) AND (n$="") THEN code%
!(&8A+T%*8+c)=&FFFFFFFF
 1680 ENDPROC
 1690 :
 1700 DATA 4C,1F,Ø4,4C,13,Ø4,4C,19,137
 1710 DATA Ø4,4C,56,Ø4,4C,56,Ø4,ØØ,15Ø
 1720 DATA ØØ,ØØ,ØØ,A9,Ø2,2Ø,EE,FF,2B8
 1730 DATA 6Ø,A9,Ø3,2Ø,EE,FF,6Ø,8D,4Ø6
 1740 DATA 1Ø,Ø4,8E,11,Ø4,8C,12,Ø4,159
 1750 DATA AD,ØF,Ø4,FØ,Ø9,EE,ØF,Ø4,2BA
 1760 DATA AD,1Ø,Ø4,4C,57,Ø4,AD,1Ø,225
 1770 DATA Ø4,C9,8D,DØ,Ø6,CE,ØF,Ø4,311
 1780 DATA 4C,5Ø,Ø4,C9,ØØ,3Ø,1Ø,C9,272
 1790 DATA 6Ø,DØ,Ø2,A9,23,2Ø,E3,FF,4ØØ
 1800 DATA AE,11,Ø4,AC,12,Ø4,6Ø,29,2ØE
 1810 DATA ØF,ØA,ØA,ØA,AA,BD,8A,Ø4,222
 1820 DATA C9,FF,FØ,EC,49,8Ø,9D,8A,594
 1830 DATA Ø4,29,8Ø,DØ,Ø4,E8,E8,E8,439
 1840 DATA E8,BD,8A,Ø4,29,Ø3,A8,E8,3EF
 1850 DATA A9,Ø1,2Ø,EE,FF,BD,8A,Ø4,4Ø2
 1860 DATA 2Ø,EE,FF,E8,88,DØ,F1,4C,58A
 1870 DATA 5Ø,Ø4,FF,FF,FF,FF,FF,FF,64E
```

Listing 2

```
   10 REM View Spooler (Po82)
   20 REM Produce ASCII files from View
   30 REM by Graham Bell
   40 REM for BBC B/B+/M/E with View
   50 REM (c) BAU May 1991
   60 :
   70 brkv=&2Ø2:osfind=&FFCE
   80 osbput=&FFD4:osasci=&FFE3
   90 osword=&FFF1:osbyte=&FFF4
  100 :
  110 DIM store &FF
  120 FOR I%=Ø TO &FF
  130 store?I%=Ø
  140 NEXT
  150 offset=store-&4ØØ
  160 :
  170 FOR pass=Ø TO 3 STEP 3
  180 P%=store
  190 [OPT pass
  200 :
  210 JMP output-offset
  220 RTS
  230 :
  240 .hand
  250 OPT FNequb(Ø)
  260 :
  270 .yreg
  280 OPT FNequb(Ø)
  290 JMP close-offset
  300 RTS
  310 :
  320 .nbrk
  330 OPT FNequw(break-offset)
  340 RTS
  350 :
  360 .text
  370 OPT FNequs(" ? emanelif loopS")
  380 OPT FNequw(&ØFØD)
  390 :
  400 .block
  410 OPT FNequw(filename-offset)
  420 OPT FNequb(&4FF-(filename-offset))
  430 OPT FNequb(33)
  440 OPT FNequb(126)
  450 :
  460 .openfile
  470 TXA
  480 PHA
  490 TYA
  500 PHA
  510 LDY #&12
  520 :
  530 .message
  540 LDA text-offset,Y
  550 JSR osasci
  560 DEY
  570 BPL message
  580 LDA #Ø
  590 LDX #(block-offset) MOD 256
  600 LDY #(block-offset) DIV 256
  610 JSR osword
  620 BCC noescape
  630 LDA #&7C
  640 JSR osbyte
  650 BRK
  660 OPT FNequb(128)
  670 OPT FNequs("Escape")
  680 BRK
  690 :
  700 .noescape
  710 LDA #&8Ø
  720 LDX #(filename-offset)MOD256
  730 LDY #(filename-offset)DIV256
  740 JSR osfind
  750 AND #&FF
  760 BNE fileopen
  770 BRK
  780 OPT FNequb(129)
  790 OPT FNequs("Can't open file")
  800 BRK
  810 :
  820 .fileopen
  830 STA hand-offset
  840 JSR vector-offset
  850 PLA
  860 TAY
  870 PLA
  880 TAX
  890 RTS
  900 :
  910 .close
  920 LDY hand-offset
  930 :
  940 .closeall
  950 LDA #Ø
  960 JSR osfind
  970 STA hand-offset
  980 :
  990 .vector
 1000 SEI
 1010 LDA brkv
 1020 LDX nbrk-offset
 1030 STA nbrk-offset
 1040 STX brkv
 1050 LDA brkv+1
 1060 LDX nbrk+1-offset
 1070 STA nbrk+1-offset
 1080 STX brkv+1
 1090 CLI
 1100 RTS
 1110 :
 1120 .break
 1130 PHA
 1140 TXA
 1150 PHA
 1160 TYA
 1170 PHA
 1180 LDY #Ø
 1190 JSR closeall-offset
 1200 PLA
 1210 TAY
 1220 PLA
 1230 TAX
 1240 PLA
 1250 JMP (brkv)
 1260 :
 1270 .output
 1280 PHA
 1290 LDA hand-offset
 1300 BNE isopen
 1310 JSR openfile-offset
 1320 :
 1330 .isopen
 1340 PLA
 1350 BMI noprint
 1360 STY yreg-offset
 1370 LDY hand-offset
 1380 JSR osbput
 1390 LDY yreg-offset
 1400 JSR osasci
 1410 :
 1420 .noprint
 1430 RTS
 1440 :
 1450 .filename
 1460 :
 1470 ]NEXT
 1480 :
 1490 sum=Ø
 1500 FOR I%=Ø TO &FF
 1510 sum=store?I%+sum
 1520 NEXT
 1530 IF sum<>&46F1 PRINT'"Checksum erro
r - please check listing":END
```

Continued ▶



◀ Continued

```
1540 PROCoscli("SAVE V.ASCII "+STR$~store+" +100 400 400")
1550 END
1560 :
1570 DEF FNequb(byte)
1580 ?P%=byte
1590 P%=P%+1
1600 =pass
1610 :
1620 DEF FNequw(word)
1630 ?P%=word MOD 256
1640 P%?1=word DIV 256
1650 P%=P%+2
1660 =pass
1670 :
1680 DEF FNequs(string$)
1690 $P%=string$
1700 P%=P%+LENstring$
1710 =pass
1720 :
1730 DEF PROCoscli(string$)
1740 DIM X% &FF
1750 Y%=X% DIV 256
1760 $X%=string$
1770 CALL &FFF7
1780 ENDPROC
```

Listing 3

```
10 REM View PAGE driver source
20 REM by Graham Bell
30 REM for B/B+/M/C/E & View family
40 REM (c) BAU May 1991
50 :
60 gxr=FALSE
70 lines=70
80 chars=82
90 name$="V.PAGE"
100 :
110 DIM store &FF
120 FOR I%=0 TO &FF
130 I%?store=0
140 NEXT
150 osbyte=&FFF4
160 oswrch=&FFEE
170 osrdch=&FFE0
180 origin=&400
190 offset=store-origin
200 :
210 FOR pass=0 TO 3 STEP 3
220 P%=store
230 [
240 OPT pass
250 JMP output-offset
260 JMP newpage-offset
270 RTS
280 BRK
290 BRK
300 RTS
310 :
320 .char BRK
330 .line BRK
340 RTS
350 :
360 .error
370 BRK
380 OPT FNequb(128)
390 OPT FNequs("Bad mode")
400 BRK
410 :
420 .waitforpage
430 LDX #4
440 JSR text-offset
450 JSR osrdch
460 :
470 .newpage
480 LDA #135
490 JSR osbyte
500 CPY #2
510 BCC modeok
520 CPY #4
530 BCC error
540 CPY #6
550 BCS error
560 :
570 .modeok
580 LDX #0
590 STX line-offset
600 :
610 .newline
620 JSR text-offset
630 STX count-offset
640 STX count+1-offset
650 RTS
660 :
670 .text
680 LDY data-offset,X
690 LDA data+1-offset,X
700 SEC
710 SBC data-offset,X
720 TAX
730 :
740 .loop
750 LDA data-offset,Y
760 JSR oswrch
770 INY
780 DEX
790 BNE loop
800 RTS
810 :
820 .output
830 STA char-offset
840 TXA
850 PHA
860 TYA
870 PHA
880 LDA line-offset
890 CMP #lines
900 BCC notnewpage
910 JSR waitforpage-offset
920 :
930 .notnewpage
940 LDA char-offset
950 BMI return
960 LDX #1
970 CMP #13
980 BNE noteoln
990 JSR newline-offset
1000 INC line-offset
1010 JMP return-offset
1020 :
1030 .noteoln
1040 INX
1050 CMP #32
1060 BNE print
1070 INX
1080 :
1090 .print
1100 JSR text-offset
1110 SEC
1120 LDA count-offset
1130 SBC #8
1140 STA count-offset
1150 BCS return
1160 DEC count+1-offset
1170 :
1180 .return
1190 PLA
1200 TAY
1210 PLA
1220 TAX
1230 LDA char-offset
1240 RTS
1250 :
1260 .data
1270 OPT FNequb(string0-data)
1280 OPT FNequb(string1-data)
1290 OPT FNequb(string2-data)
1300 OPT FNequb(string3-data)
1310 OPT FNequb(string4-data)
1320 OPT FNequb(stringend-data)
1330 :
1340 .string0
1350 OPT FNvdu(26)
1360 OPT FNvdu(FNcls(gxr))
1370 OPT FNorig(640-chars*4,496-lines*6)
1380 OPT FNplot(4,0,0)
1390 OPT FNpage(gxr)
1400 OPT FNplot(4,0,lines*12-5)
1410 :
1420 .string1
1430 OPT FNplot(0,0,-12)
1440 :
1450 .string2
1460 OPT FNdot(gxr)
1470 :
1480 .string3
1490 OPT FNplot(0,8,0)
1500 :
1510 .string4
1520 OPT FNequs("Next page..")
1530 :
1540 .stringend
1550 BRK
1560 ]
1570 count=string1+2
1580 NEXT pass
1590 :
1600 sum=0
1610 FOR I%=0 TO &FF
1620 sum=sum+I%?store
1630 NEXT
1640 IF (sum <> FNtotal(gxr)) AND (lines=70) AND (chars=82) THEN PRINT "checksum error - please check listing":END
1650 PROCoscli("SAVE "+name$+" "+STR$~store+" +100 40C 400")
1660 END
1670 :
1680 DEF FNdot(graphic)
1690 IF graphic THEN GOTO 1770
1700 [
1710 OPT pass
1720 OPT FNplot(2,7,0)
1730 OPT FNplot(0,-7,-7)
1740 OPT FNplot(2,7,0)
1750 OPT FNplot(0,1,7)
1760 ]=pass
1770 [
1780 OPT pass
1790 OPT FNplot(98,7,-7)
1800 OPT FNplot(0,1,7)
1810 ]=pass
1820 :
1830 DEF FNpage(graphic)
1840 IF graphic THEN GOTO 1910
1850 [
1860 OPT pass
1870 OPT FNplot(4,chars*8-1,0)
1880 OPT FNplot(85,0,lines*12-1)
1890 OPT FNplot(85,chars*8-1,lines*12-1)
1900 ]=pass
1910 [
1920 OPT pass
1930 OPT FNplot(102,chars*8-1,lines*12-1)
1940 ]=pass
1950 :
1960 DEF FNtotal(graphic)
1970 IF graphic THEN=&4681 ELSE=&4A49
1980 :
1990 DEF FNcls(graphic%)
2000 IF graphic% THEN=12 ELSE=16
2010 :
2020 DEF FNvdu(code)
2030 =FNequb(code)
2040 :
2050 DEF FNorig(x, y)
2060 pass=FNequb(29)
2070 pass=FNequw(x AND &FFFF)
2080 =FNequw(y AND &FFFF)
2090 :
2100 DEF FNplot(code, x, y)
2110 pass=FNequb(25)
2120 pass=FNequb(code)
2130 pass=FNequw(x AND &FFFF)
2140 =FNequw(y AND &FFFF)
2150 :
2160 DEF FNequb(byte)
2170 ?P%=byte
2180 P%=P%+1
2190 =pass
2200 :
2210 DEF FNequw(word)
2220 ?P%=word MOD 256
2230 P%?1=word DIV 256
2240 P%=P%+2
2250 =pass
2260 :
2270 DEF FNequs(string$)
2280 $P%=string$
2290 P%=P%+LEN string$
2300 =pass
2310 :
2320 DEF PROCoscli(string$)
2330 LOCAL X%, Y%
2340 DIM X% &FF
2350 Y%=X% DIV 256
2360 $X%=string$
2370 CALL &FFF7
2380 ENDPROC
```

Softie

Listing 1

```
10 REM Softie (Softie1)
20 REM Soft key extensions
30 REM by David Holton
40 REM for Master 128 Only
50 REM (c) BBC Acorn User May 1991
60 :
70 Z%=&5000
80 zp1=&7A
90 zp2=zp1+1
100 copyVec1=zp1+2
110 copyVec2=zp1+3
120 copyHi=&93
130 osasci=&FFE3
140 osnewl=&FFE7
150 oswrch=&FFEE
160 osbyte=&FFF4
170 oscli=&FFF7
180 :
190 FOR N%=4 TO 6 STEP 2
200 P%=&8000
210 O%=Z%
220 [ OPT N%
230 BRK
240 BRK
250 BRK
260 JMP whatsUpNow
270 EQUB &82
280 EQUB offset MOD &100
290 EQUB &91
300 .title
310 EQUS"MR SOFTIE'S Magic Soft-Keys Rom"
320 BRK
330 EQUB &0D
340 EQUS"  FK (flip banks of f1-f9)"
350 EQUB &0D
360 EQUS"  SK (show f1-f9)"
370 EQUB &0D
380 EQUS"  WK (wipe f1-f9)"
390 EQUB &0D
400 EQUB &1B
410 .offset
420 BRK
430 EQUS"(C) BBC Acorn User '91"
440 BRK
450 :
460 ]
470 O%=Z%+&1000
480 P%=&9000
490 [ OPT N%
500 :
510 .whatsUpNow
520 PHA
530 PHX
540 PHY
550 CMP #&27
560 BEQ pollJmp
570 CMP #&24
580 BEQ cpyBkJmp
590 CMP #&15
600 BEQ initJmp
610 CMP #9
620 BEQ help
630 CMP #4
640 BEQ youRang
650 :
660 .noClaim
670 PLY
680 PLX
690 PLA
700 RTS
710 :
720 .pollJmp
730 JMP pollOn
740 :
750 .initJmp
760 LDA &209
770 INA
780 BEQ noClaim
790 JMP initiate
800 :
810 .cpyBkJmp
820 JMP copyBack
830 :
840 .help
850 LDA (&F2),Y
860 CMP #&0D
870 BNE notOurHelp
880 JSR osnewl
890 LDX #&FF
900 .helpLoop
910 INX
920 LDA title,X
930 JSR osasci
940 CMP #&1B
950 BNE helpLoop
960 JSR osnewl
970 .notOurHelp
980 JMP noClaim
990 :
1000 .youRang
1010 INY
1020 INY
1030 LDA (&F2),Y
1040 CMP #&0D
1050 BNE notOurs
1060 DEY
1070 LDA (&F2),Y
1080 AND #&DF
1090 CMP #ASC"K"
1100 BNE notOurs
1110 DEY
1120 LDA (&F2),Y
1130 AND #&DF
1140 CMP #ASC"F"
1150 BEQ flipJmp
1160 CMP #ASC"S"
1170 BEQ showJmp
1180 CMP #ASC"W"
1190 BEQ wipeJmp
1200 .notOurs
1210 JMP noClaim
1220 :
1230 .flipJmp
1240 JMP flip
1250 :
1260 .showJmp
1270 JMP show
1280 :
1290 .wipeJmp
1300 JMP wipe
1310 :
1320 .pollOn
1330 LDA #&16
1340 JSR osbyte
1350 JMP noClaim
1360 :
1370 .initiate
1380 SEI
1390 LDA #oscliTrap MOD &100
1400 STA &DAB
1410 LDA #oscliTrap DIV &100
1420 STA &DAC
1430 LDA &F4
1440 STA &DAD
1450 LDA #&FF
1460 STA &209
1470 LDA #&0C
1480 STA &208
1490 CLI
1500 LDA #&17
1510 JSR osbyte
1520 JMP noClaim
1530 :
1540 .oscliTrap
1550 JSR &E802
1560 LDA &701
1570 AND #&DF
1580 CMP #ASC"K"
1590 BNE noNeed
1600 JSR save
1610 JSR byeAndy
1620 .noNeed
1630 RTS
1640 :
1650 .pageInAndy
```

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```
1660 LDA &F4
1670 ORA #&80
1680 BRA fixRomsel
1690 :
1700 .byeAndy
1710 LDA &F4
1720 AND #&7F
1730 .fixRomsel
1740 STA &FE30
1750 STA &F4
1760 RTS
1770 :
1780 .testPtrs
1790 LDY #&10
1800 .chkLoop
1810 LDA &8011,Y
1820 CMP #&80
1830 BMI fail
1840 CMP #&84
1850 BPL fail
1860 DEY
1870 BPL chkLoop
1880 RTS
1890 .fail
1900 LDA #&12
1910 JSR osbyte
1920 RTS
1930 :
1940 .save
1950 JSR pageInAndy
1960 JSR testPtrs
1970 .update
1980 LDA &800F
1990 STA &F8
2000 LDA &8020
2010 STA &F9
2020 LDY #&21
2030 .upDloop
2040 LDA &8000,Y
2050 STA store,Y
2060 DEY
2070 BPL upDloop
2080 RTS
2090 :
2100 .copyBack
2110 LDY #&10
2120 .chkLoop2
2130 LDA store+&11,Y
2140 CMP #&80
2150 BMI copout
2160 CMP #&84
2170 BPL copout
2180 DEY
2190 BPL chkLoop2
2200 JSR pageInAndy
2210 LDY #&21
2220 .cBloop
2230 LDA store,Y
2240 STA &8000,Y
2250 DEY
2260 BPL cBloop
2270 .copout
2280 JSR byeAndy
2290 JMP noClaim
2300 :
2310 .flip
2320 JSR pageInAndy
2330 SEI
2340 LDY #0
2350 LDX #4
2360 LDA #&80
2370 STA zp2
2380 STZ zp1
2390 LDA #copyHi
2400 STA copyVec2
2410 STZ copyVec1
2420 .flipLoop
2430 LDA (zp1),Y
2440 STA temp
2450 LDA (copyVec1),Y
2460 STA (zp1),Y
2470 LDA temp
2480 STA (copyVec1),Y
2490 INY
2500 BNE flipLoop
2510 INC zp2
2520 INC copyVec2
2530 DEX
2540 BNE flipLoop
2550 CLI
2560 JSR testPtrs
2570 JSR update
2580 :
2590 .show
2600 JSR byeAndy
2610 LDA #&20
2620 STA zp1
2630 STA zp2
2640 LDA &355
2650 CMP #7
2660 BNE showGo
2670 LDA #&82
2680 STA zp1
2690 INA
2700 STA zp2
2710 .showGo
2720 JSR osnewl
2730 LDA #ASC"0"
2740 .shoLoop
2750 PHA
2760 LDA zp1
2770 JSR oswrch
2780 PLA
2790 PHA
2800 JSR oswrch
2810 LDA zp2
2820 JSR oswrch
2830 PLA
2840 PHA
2850 STA shoText+5
2860 LDX #shoText MOD &100
2870 LDY #shoText DIV &100
2880 JSR oscli
2890 PLA
2900 INA
2910 CMP #1+ASC"9"
2920 BNE shoLoop
2930 JSR osnewl
2940 PLY
2950 PLX
2960 PLA
2970 LDA #0
2980 RTS
2990 :
3000 .wipe
3010 LDA #&12
3020 JSR osbyte
3030 JSR pageInAndy
3040 JSR update
3050 JMP show
3060 :
3070 .shoText
3080 EQUS"SHOW ?"
3090 EQUB &0D
3100 :
3110 .temp
3120 BRK
3130 .store
3140 ]
3150 NEXT
3160 OSCLI "SRWRITE
"+STR$~Z%+" "+STR$~
(O%+1)+" 8000 7"
```

New Wine

Listing 1

```
  10 REM New Wine from Old Bottles (New
Wine1)
  20 REM Dot matrix to Postscript
  30 REM By David N Waters
  40 REM For B/B+/M/C/A
  50 REM (c) BAU May 1991
  60 :
  70 REM Codes supported are:
  80 REM 8        Backspace
  90 REM 13       Return (interpreted a
s newline)
  100 REM 27,45,1  Underline on
  110 REM 27,45,0  Underline off
  120 REM 27,52    Italic on
  130 REM 27,53    Italic off
  140 REM 27,69    Bold on
  150 REM 27,70    Bold off
  160 REM 27,82,0  USA character set
  170 REM 27,82,3  UK character set
  180 REM 27,83,0  Superscript
  190 REM 27,83,1  Subscript
  200 REM 27,84    Cancel superscript/su
bscript
  210 REM "\"      Octal escape sequence
  220 REM "|"      Absolute position
  230 :
  240 MODE 7
  250 ON ERROR PROCerror(1)
  260 PROCprologue
  270 PROCscript
  280 END
  290 :
  300 DEF PROCerror(n)
  310 CLOSE#y%
  320 *FX2,0
  330 *FX3,0
  340 VDU 7,10
  350 IF n=1 REPORT:PRINT" at line ";ERL
:END
  360 IF n=2 PRINT"Unexpected character:
 ASCII value ";c%'"on page ";pg%;" line
";lf%+1:STOP
  370 IF n=3 PRINT"Superscript/Subscript
/Underline"'"not permitted across page b
oundary":STOP
  380 ENDPROC
  390 :
  400 DEF PROCprologue
  410 PRINT'CHR$131;CHR$157;CHR$132;"Dot
-Matrix to PostScript Translator"
  420 PRINT CHR$131;CHR$157;CHR$132;"
 For Epson-coded Spool files"
  430 *CAT
  440 PRINT'''CHR$131;CHR$157;CHR$132;"G
ive directory ";
  450 INPUT D$
  460 IF D$="$" GOTO 490
  470 OSCLI("DIR "+D$)
  480 *CAT
  490 PRINT'CHR$131;CHR$157;CHR$132;"Giv
e filename ";
  500 INPUT file$
  510 PRINT'CHR$131;CHR$157;CHR$132;"Cho
ose font family:"'CHR$131;CHR$157;CHR$13
2;"1 Times   2 Helvetica   3 Courier"
  520 REPEAT g%=GET-48
  530 UNTIL g%>=1 AND g%<=3
  540 *FX7,7
  550 *FX8,7
  560 *FX156,16,227
  570 *FX2,1
  580 *FX3,7
  590 *FX15,0
  600 :
  610 REM For Arc only, sets XON/XOFF:SY
S "OS_SerialOp",0,7,&FFFFFFF8
  620 :
  630 w$=STRING$(120," "):REM Max line 1
ength in Inter-Word
  640 DIM d%(3),font$(4),ulp$(4),ulp%(4)
,ulw$(4),ulw%(4),style$(4)
  650 bold=FALSE
  660 oblique=FALSE
  670 boldoblique=FALSE
  680 ul=FALSE
  690 uk=FALSE
  700 sup=FALSE
  710 sub=FALSE
  720 lf%=0
  730 x%=0
  740 pg%=1
  750 IF g%=1 RESTORE 1070 ELSE IF g%=2
RESTORE 1080 ELSE RESTORE 1090
  760 :
  770 FOR i%=1 TO 4
  780 READ font$(i%),ulp%(i%),ulw%(i%)
  790 NEXT
  800 READ pt1%,pt2%:pt1$=STR$(pt1%):pt2
$=STR$(pt2%)
  810 FOR i%=1 TO 4
  820 ulp$(i%)=STR$(ulp%(i%)*pt1%/1000)
  830 ulw$(i%)=STR$(ulw%(i%)*pt1%/1000)
  840 NEXT
  850 PRINT"%!"
  860 RESTORE 1100
  870 FOR i%=1 TO 4
  880 READ style$(i%)
  890 PRINT"/"+style$(i%)+" "+font$(i%)+
" findfont "+pt1$+" scalefont def"
  900 PRINT"/"+style$(i%)+"small "+font$
(i%)+" findfont "+pt2$+" scalefont def"
  910 NEXT
  920 PRINT"/s {show} def"
  930 PRINT"/nl {-12 mul 0 exch moveto}
def"
  940 PRINT"/underline {0 3 index neg rm
oveto"
  950 PRINT"stringwidth pop dup neg 0 rm
oveto 0 rlineto"
  960 PRINT"setlinewidth gsave stroke gr
estore"
  970 PRINT"0 exch rmoveto} def"
  980 PRINT"/tab {7.2 mul currentpoint p
op sub 0 rmoveto} def":REM Factor 7.2 co
rrect for Courier fonts. A smaller facto
r, e.g. about 6, may be preferred for Ti
mes and Helvetica
  990 PRINT"/over {gsave dup stringwidth
 pop 3 -1 roll stringwidth pop add 2 div
 neg 0 rmoveto show grestore} def"
  1000 f$=style$(1)
  1010 up$=ulp$(1):uw$=ulw$(1)
  1020 PRINT f$+" setfont"
  1030 PRINT"20 808 translate"
  1040 PRINT"0 0 moveto"
  1050 PRINT"save"
  1060 ENDPROC
  1070 DATA /Times-Roman,237,49,/Times-It
alic,272,48,/Times-Bold,307,95,/Times-Bo
ldItalic,282,54,12,8
  1080 DATA /Helvetica,255,73,/Helvetica-
Oblique,258,73,/Helvetica-Bold,289,73,/H
elvetica-BoldOblique,268,105,12,8
  1090 DATA /Courier,288,40,/Courier-Obli
que,288,40,/Courier-Bold,288,100,/Courie
r-BoldOblique,304,100,12,8
  1100 DATA nml,obl,bld,bdq
  1110 :
  1120 DEF PROCscript
  1130 y%=OPENIN(file$)
  1140 REPEAT
  1150 REPEAT
  1160 c%=BGET#y%
  1170 IF c%=124 PROCalign:GOTO 1240
  1180 IF c%>=32 AND c%<127 PROCtext:GOTO
 1240
  1190 IF c%=13 PROCnewline:GOTO 1240
  1200 IF c%=27 PROCescape:GOTO 1240
  1210 IF c%=8 PROCbs:GOTO 1240
  1220 IF EOF#y% GOTO 1240
  1230 IF NOT (c%=10 OR c%=14 OR c%=15 OR
 c%=18) PROCerror(2):REM Skip irrelevant
 codes
  1240 UNTIL lf%=66 OR EOF#y%
  1250 PRINT"showpage"
  1260 IF NOT EOF#y% PROCnewpage
  1270 UNTIL EOF#y%
  1280 PRINT"currentfile closefile "
  1290 CLOSE#y%
  1300 *FX2,0
  1310 *FX3,0
  1320 PRINT'CHR$131;CHR$157;CHR$132;"Don
e!"
  1330 ENDPROC
  1340 :
  1350 DEF PROCnewpage
  1360 PRINT"restore save"
  1370 lf%=0
  1380 x%=0
  1390 pg%=pg%+1
  1400 IF bold PROCboldon
  1410 IF oblique PROCoblqon
  1420 IF (sup OR sub OR ul) PROCerror(3)
  1430 ENDPROC
  1440 :
  1450 DEF PROCnewline
  1460 lf%=lf%+1:x%=0
  1470 REPEAT
  1480 c%=BGET#y%
  1490 IF c%=13 lf%=lf%+1:x%=0
  1500 UNTIL c%<>13 OR lf%=66
  1510 IF lf%<=65 PRINT STR$(lf%)+" nl":P
TR#y%=PTR#y%-1
  1520 ENDPROC
  1530 :
  1540 DEF FNhash
  1550 IF uk=TRUE THEN="\243" ELSE ="\043
"
  1560 :
  1570 DEF FNparen(b%)="\"+CHR$(b%)
  1580 :
  1590 DEF FNbackslash
  1600 IF EXT#y%-PTR#y%<=2 PROCerror(2)
  1610 FOR i%=1 TO 3
  1620 d%(i%)=BGET#y%
  1630 NEXT
  1640 IF d%(1)>=48 AND d%(1)<=51 AND d%(
2)>=48 AND d%(2)<=55 AND d%(3)>=48 AND d
%(3)<=55 AND VAL(CHR$(d%(1)))*64+VAL(CHR
$(d%(2)))*8+VAL(CHR$(d%(3)))<=251 THEN =
"\"+CHR$(d%(1))+CHR$(d%(2))+CHR$(d%(3))
ELSE PROCerror(2)
  1650 :
  1660 DEF PROCalign
  1670 PRINT STR$(x%)+" tab"
  1680 ENDPROC
  1690 :
  1700 DEF PROCtext
  1710 q=FALSE
  1720 w$=""
  1730 REPEAT
  1740 IF c%=35 w$=w$+FNhash:x%=x%+1:GOTO
 1800
  1750 IF c%=40 OR c%=41 w$=w$+FNparen(c%
):x%=x%+1:GOTO 1800
  1760 IF c%=92 w$=w$+FNbackslash:x%=x%+4
:GOTO 1800
  1770 IF c%=124 q=TRUE:GOTO 1810
  1780 IF c%>=32 AND c%<127 w$=w$+CHR$(c%
):x%=x%+1:GOTO 1800
  1790 q=TRUE:GOTO 1810
  1800 c%=BGET#y%
  1810 UNTIL q
  1820 PRINT"("+w$+") s":IF ul PROCu
  1830 PTR#y%=PTR#y%-1
  1840 ENDPROC
  1850 :
  1860 DEF PROCu
  1870 PRINT up$+" "+uw$+"("+w$+")"+" und
erline"
  1880 ENDPROC
  1890 :
  1900 DEF PROCescape
  1910 c%=BGET#y%
  1920 IF c%=69 bold=TRUE:PROCboldon:ENDP
ROC
  1930 IF c%=70 bold=FALSE:PROCboldoff:EN
DPROC
  1940 IF c%=52 oblique=TRUE:PROCoblqon:E
NDPROC
  1950 IF c%=53 oblique=FALSE:PROCoblqoff
:ENDPROC
  1960 IF c%=45 PROCunderline:ENDPROC
  1970 IF c%=82 PROCinternat:ENDPROC
  1980 IF c%=83 PROCss:ENDPROC
  1990 IF c%=84 PROCcancelss:ENDPROC
  2000 IF NOT (c%=15 OR c%=40 OR c%=64 OR
 c%=77 OR c%=80 OR c%=110 OR c%=111) PRO
Cerror(2):REM Skip irrelevant codes
  2010 ENDPROC
  2020 :
  2030 DEF PROCboldon
  2040 IF oblique f$=style$(4):PRINT f$+"
 setfont":up$=ulp$(4):uw$=ulw$(4) ELSE f
$=style$(3):PRINT f$+" setfont":up$=ulp$
(3):uw$=ulw$(3)
  2050 ENDPROC
  2060 :
  2070 DEF PROCboldoff
  2080 IF oblique f$=style$(2):PRINT f$+"
 setfont":up$=ulp$(2):uw$=ulw$(2) ELSE f
$=style$(1):PRINT f$+" setfont":up$=ulp$
(1):uw$=ulw$(1)
  2090 ENDPROC
  2100 :
  2110 DEF PROCoblqon
  2120 IF bold f$=style$(4):PRINT f$+" se
tfont":up$=ulp$(4):uw$=ulw$(4) ELSE f$=s
tyle$(2):PRINT f$+" setfont":up$=ulp$(2)
:uw$=ulw$(2)
  2130 ENDPROC
  2140 :
  2150 DEF PROCoblqoff
  2160 IF bold f$=style$(3):PRINT f$+" se
tfont":up$=ulp$(3):uw$=ulw$(3) ELSE f$=s
tyle$(1):PRINT f$+" setfont":up$=ulp$(1)
:uw$=ulw$(1)
  2170 ENDPROC
  2180 :
  2190 DEF PROCunderline
  2200 c%=BGET#y%
  2210 IF c%=0 ul=FALSE ELSE IF c%=1 ul=T
RUE ELSE PROCerror(2)
  2220 ENDPROC
  2230 :
  2240 DEF PROCss
  2250 c%=BGET#y%
  2260 IF c%=0 sup=TRUE:GOSUB 2320
  2270 IF c%=1 sub=TRUE:GOSUB 2340
  2280 IF c%>=2 PROCerror(2)
  2290 PRINT f$+"small setfont"
  2300 ENDPROC
  2310 :
  2320 IF sub PRINT"0 9 rmoveto":sub=FALS
E ELSE PRINT"0 5 rmoveto"
  2330 RETURN
  2340 IF sup PRINT"0 -9 rmoveto":sup=FAL
SE ELSE PRINT"0 -4 rmoveto"
  2350 RETURN
  2360 :
  2370 DEF PROCcancelss
  2380 PRINT f$+" setfont"
  2390 IF sup PRINT"0 -5 rmoveto":sup=FAL
SE
  2400 IF sub PRINT"0 4 rmoveto":sub=FALS
E
  2410 ENDPROC
  2420 :
  2430 DEF PROCinternat
  2440 c%=BGET#y%
  2450 IF c%=0 uk=FALSE ELSE IF c%=3 uk=T
RUE ELSE PROCerror(2)
  2460 ENDPROC
  2470 :
  2480 DEF PROCbs
  2490 PTR#y%=PTR#y%-2
  2500 v$=CHR$(BGET#y%)
  2510 PTR#y%=PTR#y%+1
  2520 c%=BGET#y%
  2530 IF c%=35 w$=FNhash:x%=x%+1:GOTO 25
80
  2540 IF c%=40 OR c%=41 w$=FNparen(c%):x
%=x%+1:GOTO 2580
  2550 IF c%=92 w$=FNbackslash:x%=x%+4:GO
TO 2580
  2560 IF c%>=32 AND c%<127 AND c%<>124 w
$=CHR$(c%):x%=x%+1:GOTO 2580
  2570 PROCerror(2)
  2580 PRINT"("+v$+") ("+w$+") over"
  2590 ENDPROC
```

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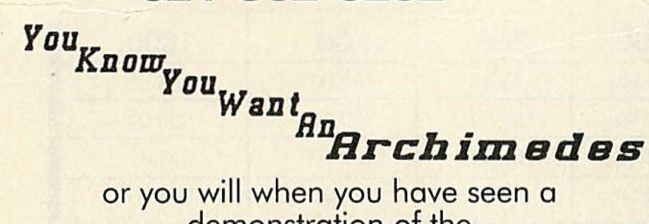
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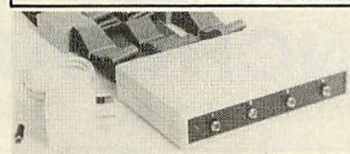
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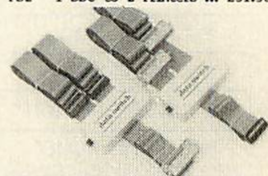


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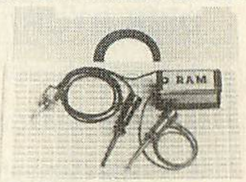
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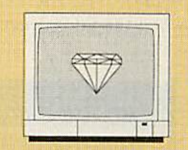
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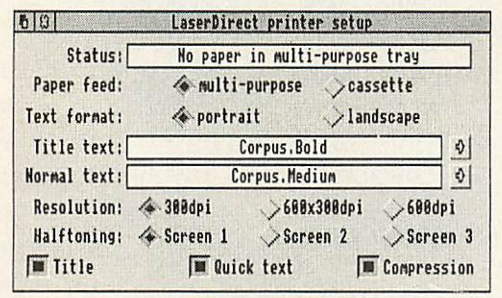
5 GOOD
FOR CHOOSING

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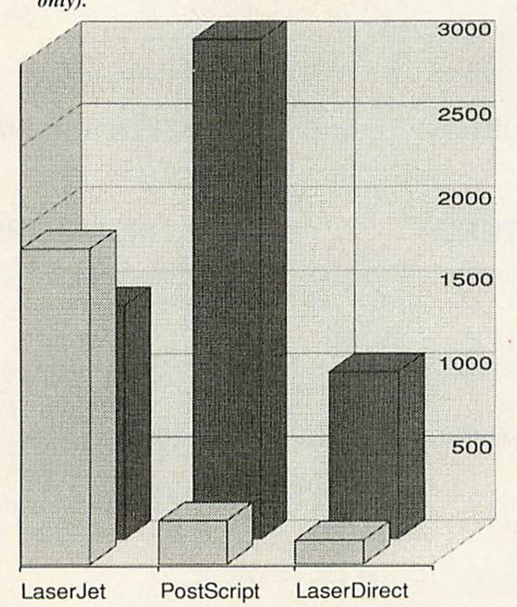
5 reasons why LaserDirect printers have become the most popular laser printer for the Archimedes.

1. *Direct Drive*

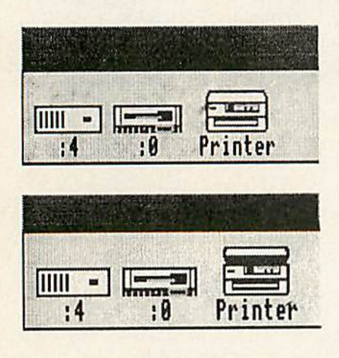
The LaserDirect printer consists of a single expansion board that fits inside the Archimedes connected to a special version of a liquid crystal print mechanism or a laser print engine, all driven by some advanced printer driver software. By omitting the electronics from the laser printer and allowing the Archimedes to control the laser and printer mechanism directly, the LaserDirect system is cheaper, faster and more flexible than traditional printers. By avoiding the bottleneck of the serial or parallel port, data can be transferred up to 200 times faster. By having a bi-directional data transfer the printer returns useful information back to the computer, so the software knows when the printer is out of paper or toner, or when the lid is open.



Status shows feedback from printer. This diagram also shows resolution settings (for LaserDirect HiRes only).



Laser-Direct has a lower cost and shorter print times than other laser printers



Open the lid of the printer, and the printer icon reflects this operation

Since the ARM processor is much faster than the typical processor contained in the printer, it is able to build up the printer image far faster than traditional printers. Also, because the Archimedes performs the picture and text rendering, it can use the Acorn outline fonts and graphic facilities to guarantee absolute RISC OS compatibility if you have a font on screen then you can be sure it will print.

2. *Fast Text**

The normal Acorn text printing routines are not optimised for the high resolution monochrome printing. With the LaserDirect, special optimised text printing routines have been provided that can double or triple the speed of printing outline font text. Since these routines can render the text directly at a 90 degree angle, it also means that printing sideways can be faster still.

3. *Page Queueing**

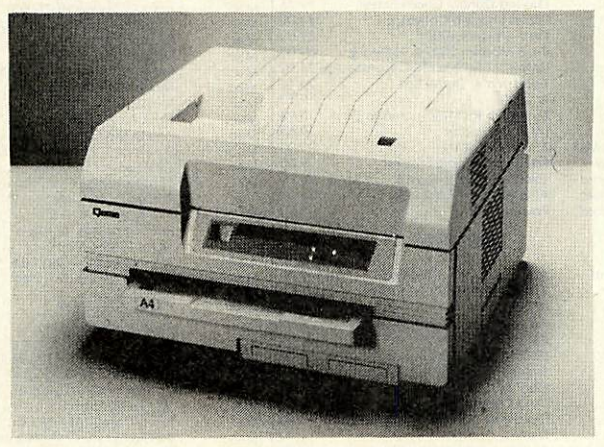
The software creates pages, so fast that in many cases the printer can't keep up. Therefore the LaserDirect printer driver allows the pages to be stored in a queue so that they are ready as soon as the printer has output the previous page. For pages of text this typically means the printer can print as fast as it can get pages through the mechanism- 6 pages per minute with the standard LaserDirect, 8 pages per minute for LaserDirect Hi Res.

4. *Background Printing**

In conjunction with the page queue, the LaserDirect software allows background printng. This has several significant advantages. Not only can the printer be reading pages from the queue while the computer is used for other purposes, it also allows subsequent pages of a multi-page document to be rendered while earlier pages are being output. It also means that printing multiple copies of a page occupies the computer for no longer than it takes to print one copy.

REASONS

LASER DIRECT

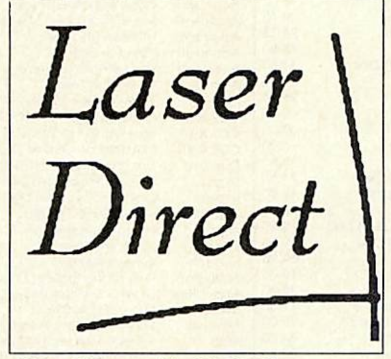


LaserDirect

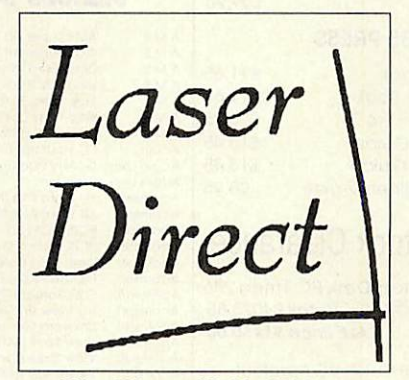
LaserDirect Hi Res

5. *High Resolution**

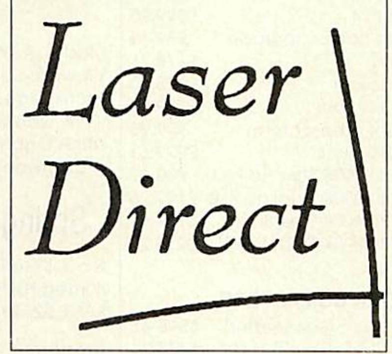
The laserDirect Hi Res has the additional capability to control the printer dot size and position to a much higher degree of accuracy than normal 300 dpi printers. The software offers three resolutions from 300 by 300 dpi to 600 by 600 dpi. At the higher resolutions the jaggies that can sometimes be seen with 300 dpi printers are all but eliminated, giving far smoother curves and italic text - ideal for the more professional applications.



300 x 300 magnified by 300%



300 x 600 magnified by 300%



600 x 600 magnified by 300%

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LaserDirect £999 + VAT
LaserDirect Hi Res £1495 + VAT



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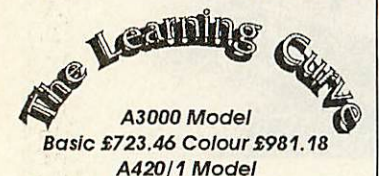
**All features marked with an asterisk are unique to LaserDirect printers and are not available on any other printer, direct drive or otherwise.*



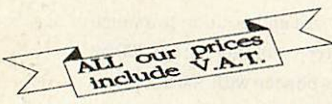
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SYMBOLIC SUMS

DAVE LAWRENCE looks at a package which can help you sum up DTP output on the Archimedes

Last July I reviewed the typesetting system, *TeX*. One of its main features is its ability to typeset mathematic equations. However, *TeX* was never designed to fit in with Risc OS – this is where *Equasor* comes in.

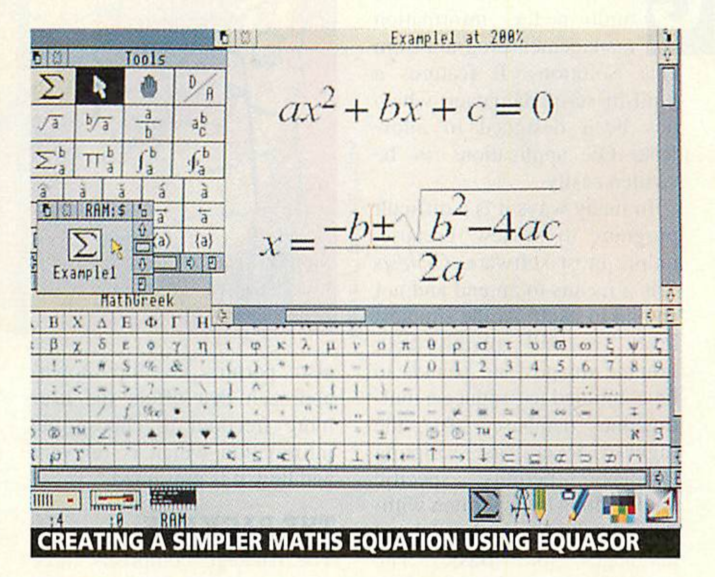
Instead of attempting to integrate *TeX* with other, Archimedes applications, Computer Concepts has taken a step back and written its own maths 'engine'.

Equasor is fully Risc OS compliant. All the windows and dialogue boxes have the now standard *Impression* look and feel about them and most menu options have keyboard short cuts. Font selection is made from an *Impression*-style font menu and, to produce a new equation, just select 'New equation' from the menu, point where you want to start and type it in.

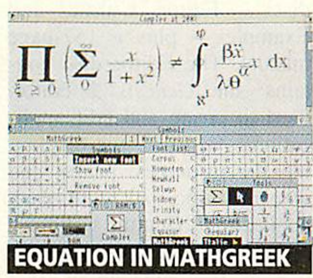
If you need any peculiar symbols, like infinities or alephs, the Symbol window can be used to display the supplied MathGreek font.

Most of the time *Equasor* will automatically add space around operators and symbols. Both SPACE and TAB can be programmed to add in an exact amount of extra space. One annoyance is that space is correctly added around plus and minus signs, but the wrong sort of minus sign is used (Ascii 45, a dash, instead of Ascii 153). The correct one can be added by mouse from the Symbols window, but the auto spacing no longer works.

A separate Tools window contains all the various divides, powers, roots and brackets that you'll need. For example, to square root part of your expression, you highlight it either by clicking on it or by dragging a box round it, then clicking on the square root symbol.



CREATING A SIMPLER MATHS EQUATION USING EQUASOR


EQUATION IN MATHGREEK


OOPS! INFINITE DIVISION

Summations and integral signs are also provided and *Equasor* knows all about where limits and so on should be added. You can move back and forward through the expression with the cursor keys – the size and location of the caret indicates where text will be added into the equation. I have managed to confuse the program a few times and it has left little bits of divide lines behind, but this is only a screen problem – they seem to print okay.

Equasor tries to intelligently resize brackets and the other similar 'tools' if you change the part of the equation they refer to. For example, if you had '(x+y)', select the 'x+y' bit and added a division with 'x-y' underneath, *Equasor* would make the brackets bigger. Unfortunately it doesn't always get this perfectly right – have a look at the 'infinite division' on this page!

More successful resizing occurs when raising to powers – the point size of the 'power' is correctly reduced even when copying a large equation into a 'power'.

Accents (tildes, dots, bars, etc.) can be added to single characters only – nothing larger. You can't produce proper vector equations (with overscored arrows). There is also no 'prime' accent, so you have to use a single quote.

You can work on up to eight 'documents' at once, each containing as many equations as you want. Equations, or parts thereof, can be moved physically around the page with the hand icon on the Tools menu.

Files can be saved in *Equasor* format, but these can only be read correctly by *Impression* 2.05 (or later) or *Equasor* itself. To load into *Draw*, or anything else, you have to save in *Draw* format, but you then can't load it back into *Equasor*!

One major omission is there are no facilities for dealing with matrices – you have to type them in a line at a time in different equations or use the rather fiddly user structure.

My last complaint is that you cannot produce a sequence of equations with their '='s lined up. A 'Return to =' option is provided (pressing RETURN at the end of a line moves the cursor down a line and back to below the previous '='), but you cannot enter an equation to the left of this '='.

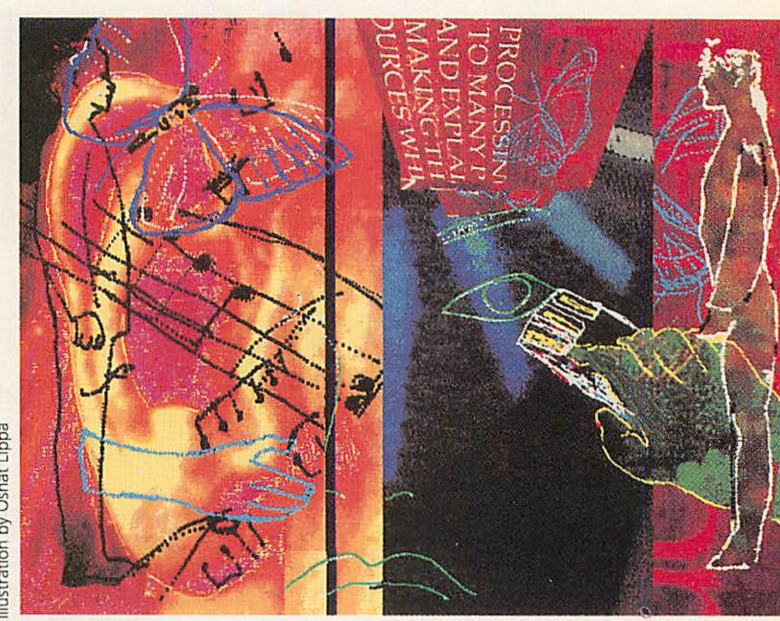
This means that you can't easily produce proofs of equations being equivalent (ie, reducing both sides and coming up with 0=0).

Apart from these oversights, *Equasor* is an indispensable program. I can see it being a positive boon in education. My copy sits proudly on my shelf alongside *Impression* and *Poster*. All I want now is an equivalent program to typeset tables (*Tabulator*!).

Equasor for the Archimedes costs £56.35. For further details, contact: Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX. Tel: (0442) 63933.

SECOND COMING

Genesis is renowned for being the most versatile software available for the Archimedes. **CHRIS DRAGE** looks at the new updated version


Illustration by Osnat Lippa

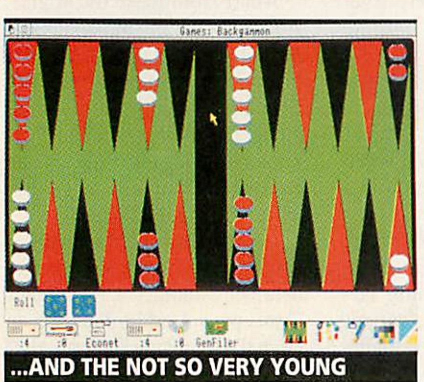
Genesis 2 is a versatile multi-media information management program from Oak Solutions. It features a built-in script language which has been designed to allow Risc OS applications to be written easily.

In many ways it is a difficult program to review because, unlike most software, *Genesis 2* is a means to an end and not an end in itself. At the simplest level, it will permit text, graphic images and sounds to be combined to produce a multimedia database. At the highest level, its scripting language permits specific applications to be written without recourse to low level languages like Basic. The possible range of applications is almost limitless.

Readers familiar with the Apple Macintosh will recognise these features as being similar to *Hypercard*. *Genesis 2* is also a 'hypermedia' system in that it differs from most software by being able to mix media, presenting information in a variety of ways.



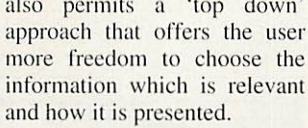
NUMBERS FOR THE VERY YOUNG...



...AND THE NOT SO VERY YOUNG

With the exception of desktop publishing, data presented on computer systems has traditionally been in a linear format with little, if any, mixing of media.

Wordprocessors, art packages, and other applications produce material which typically is in one form only. Hypermedia can change all that by using the computer as a presentation system which is not only interactive, but



also permits a 'top down' approach that offers the user more freedom to choose the information which is relevant and how it is presented.

THE PACKAGE

The package comprises three discs – Editor, Utilities and Examples – plus a 157-page manual. The Editor disc contains: the *Genesis 2* editor, used to create and edit applications; Genfiler, for displaying the resources, pages, and objects associated with each application; Genlib, a library of drawings, sprites, etc, for use in the applications you create, and the System resources.

The Utilities disc contains *Browser*, which allows you to access existing applications, but not alter them, and *G1_to_G2*, a utility which converts *Genesis 1* applications to *Genesis 2* format in order to save disc space.

The third disc contains four applications which are used in the handbook to help illustrate the program's features: *AboutGen* provides information about *Genesis 2* itself; *Europe* is an incomplete file demonstrating the structure of a typical application; *Add* is a simple address book/database, and *GenTools* allows menus, record cards, etc, to be created for use in new applications.

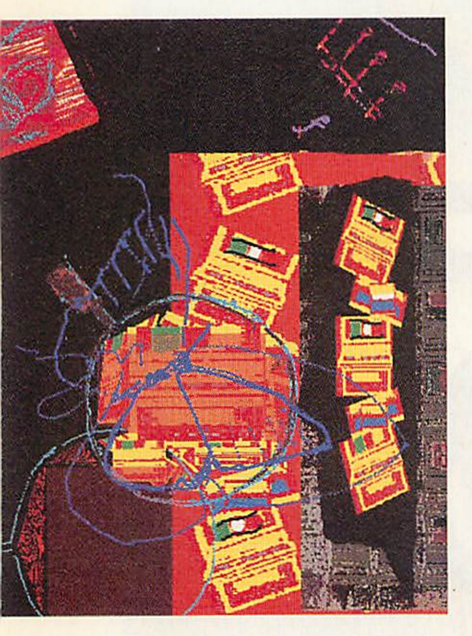
Genesis 2 provides a framework for creating pages of information which can be linked together to form an application. Once installed on the icon bar, a new application can be created by clicking the Menu button on the *Genesis* icon. A blank page then appears on the screen.

Linked pages provide the framework of an application and each one has three levels: a background layer in a single available colour; a backdrop layer, which can be a drawfile or sprite (including a full screen digitised image); and a top layer, where any number of frames can be placed, each one holding information of some kind.

Various types of data can be stored or displayed in frames simply by dragging files into them. These frames can then be linked to other pages, allowing data to be indexed or searched. They can be made transparent by turning off their borders and making their backgrounds transparent.

The *Europe* application demonstrates this feature well. Clicking anywhere on a particular country brings up a window containing relevant information, the country's flag and a 'button' to play the national anthem. Frames can

also hold multiple links to pages, links to other applications and it can be made to perform simple calculations or reveal a string of text. In addition, a number of specialised



frames can be created. The resource frames available are quite extensive:

- **Text frames** permit a variety of colour, size, styles and typefaces
- **Draw frames** allow drawfiles to be scaled to the frame's dimensions
- **Sprite frames** ensure sprite images maintain their correct proportions
- **Euclid frames** handle *Euclid* (Ace Computing) 3D pages
- **Film frames** display animated sequences created in *Mogul, Tween* and *Splice* (Ace Computing)
- **Music frames** play *Maestro* music files
- **Sample frames** allow captured digitised sounds to be played

These items represent the types of resources which *Genesis 2* recognises and treats in a special way. Digitised sound samples and graphic images, like sprites, can take up a lot of disc space and to overcome this problem, *Genesis 2* employs data compaction techniques to permit a great deal of data to be stored on a single floppy.

Another important feature are 'buttons', or objects which contain pre-defined operations which have particular effects when you drop them onto a page – for example, to add a ready-made frame, complete with special actions, to the page at the position the button occupies. A variety of buttons are provided with the system.

Once a *Genesis 2* application is complete it can be saved, printed page-by-page, have its own application icon created (via *Paint*) and its own information box completed from a blank which is provided by the software.

PAGE CREATION

A major improvement over *Genesis 1* becomes apparent during the page creation operation. As a page is built up, a program is automatically written in *Genesis 2* script language. The resulting script can be edited and altered so that a powerful programming language always lies just below the surface, available for creating all manner of applications – in many cases without you even having to touch the keyboard.

The handbook offers scant information about the features of the scripting language, nevertheless it is quite powerful, possessing a range of standard control structures, such as:

```
IF ... THEN ... ELSE, REPEAT
UNTIL, WHILE ENDWHILE, CASE
```

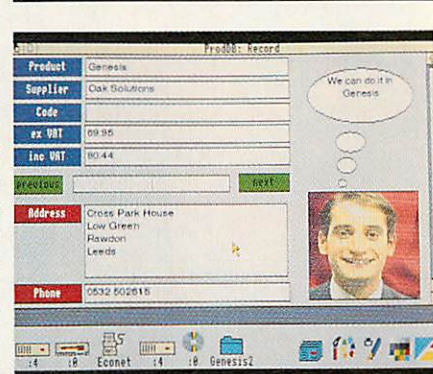
Its objects include variables, procedures and functions, menus, dialogue boxes and frames and there are comprehensive event handlers, database functions and at least 250 keywords supported.

Sections of script can be saved as button files which may be stored in the library directory to allow applications to be generated more quickly. In education alone the possibilities include: Concept Keyboard or switch controlled applications; robot control; datalogging; computer 'project folders'; CD audio; CD-Rom and IV control; passages of text with footnotes; translations, and so on.

Imagine being able to use the sampled sound frames in such a presentation for the aural translation of specific words or phrases in a variety of languages. The script language can be used to develop custom business applications dealing with accounts, customer records, mailshots, invoices, etc. Or for the home user, it can produce a card index database for cataloguing collections, or to store and relate family records (including digitised pictures).

LEARNING WITH PICTURES AND MUSIC

It is possible to confuse *Genesis 2* and *Magpie* (Longman-Logotron) thinking they are identical. But *Magpie* does not pretend to match the degree of sophistication of *Genesis 2*.



A TRULY 'PERSONAL' DATABASE

Being simple to use, it puts the creative aspects firmly in the hands of teachers and pupils while *Genesis 2* lends itself to providing a multitude of quite sophisticated multimedia applications with a sufficiently open design which means that future hardware developments can be catered for.

CONCLUSION

Multimedia with computers is concerned with harnessing a database for a specific purpose using suitable computer software. Although a 'database' frequently means a computerised card index system which lets you find someone's name and address, a *Genesis 2* database can consist of digitised sound, video and still images and textual information.

On one level, *Genesis 2* lets you combine such items into a database and to manage and edit it. On another, its scripting language allows applications to be written by those who may possess only limited programming skills. This degree of multimedia is all very well, but can become rather limited if only one machine can be accessed by a small group of individuals at a time.

Genesis 2 overcomes this by working fully across a network. With the promise of a *Genesis* multimedia tools pack this year, along with a CD-Rom and interactive video 'recorder' applications, the future looks promising for *Genesis 2*. It is almost certain to become the Risc OS standard 'hypercard' presentation tool and should spawn a wealth of useful applications.

Genesis 2 is available for the Archimedes series, and BBC A3000. It costs £149.50 (education price £115) and an upgrade for current version users costs £59.80. Contact: Oak Solutions, Cross Park House, Low Green, Rawdon, Leeds LS19 6HA. Tel: (0532) 506868.

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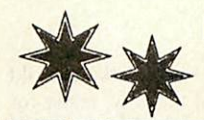
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THE EPSON LQ-400 IS QUITE A BARGAIN

MALCOLM BROWN looks at some of the latest developments in 24-pin printer technology, and lines up seven current models for Beeb and Arc users to choose from

PINNED

A 24-pin printer represents the best combination of reasonable price and performance for most users, but exactly how that is achieved remains the problem.

So what should a perfect 24-pin printer offer? Well, it must produce print that is indistinguishable from typewritten material, at a fast speed, in a wide selection of fonts, on any paper, under perfect control of the computer – and all in a package which is long-lasting and easy to use.

Of course, they haven't built perfection yet – but all of the models reviewed here go some way towards that utopia.

As usual, all these models have been tested under the same conditions, their actual printing speeds measured with the same piece of text used in the 1989 tests.

Sample prints have been given so you can make up your own mind and all the facts and figures brought together in a comparison table.

EPSON LQ-400

The LQ-400 is the cheapest of Epson's 24-pin printers, at around £293. Although cheap, it is not shoddily made.

Both friction feed (with automatic loading) and tractor feed mechanisms are provided, but when cut sheet paper is to be used, the tractor unit and its special cover must be removed and a smaller cover fitted.

When it comes to printing, the LQ-400 does a good job. Draft print is as good as some nine-pin NLQ and the NLQ print is superb.

Two NLQ print styles are supplied built-in, one a typewriter look-alike and the other a plain, Sans Serif style. Other fonts are available on plug-in cartridges for £40 each.

Although cheap, the LQ-400 can turn in a fair turn of speed. In draft mode it manages about two pages per minute and a page of NLQ takes around a minute and a quarter per page.

The front panel controls on the LQ-400 are simple enough, but only the text style and print quality are selectable here and other changes must be handled with control codes. The LQ-400 is only Epson LQ compatible, but that should serve most Acorn-related purposes. For Acorn users, the Epson LQ-400 is quite a bargain.

CITIZEN 124D

At just £320, the 124D incorporates many features only found on machines costing far more. It is well made and comes with a full guarantee.

Fanfold paper is fed with a push-feed tractor unit and a friction feed caters for cut sheets. The printer senses paper to feed and automatically loads it – easy and effective, but paper placed in the printer crooked is fed through that way before you have a chance to straighten it. An optional bulk sheet feeder is also available for a remarkably cheap £97.

The 124D will 'park' fanfold paper out of the way, ready for cut sheets and 'short tear off' is also provided to feed fanfold paper for tear off at the perforations and then automatically back again for printing.

The 124D produces excellent print for a budget machine. In NLQ mode, a more than casual inspection must be made to tell this print does not come from a typewriter.

There are two NLQ fonts to choose from, but both are typewriter lookalikes.

This is a relatively slow printer. In NLQ mode it takes about a minute and a half for a typical page of text, which is considerably faster than nine-pin printers in this price bracket, but behind most 24-pin machines.

The 124D is both Epson LQ and IBM Proprinter-compatible and partially compatible with NEC's control codes, giving the high resolution 360 dots per inch graphics.

The character style in use and the quality of print can be selected from the front panel and most other functions can be controlled with dip switches, conveniently placed under a hatch.

The 124D is certainly a budget printer. It has no great turn of speed nor fancy convenience features. However, it has all the essential features. For the rock bottom end of the market, the 124D is assured some success.

FUJITSU DL-1100

The DL-1100 costs £431 and looks quite unlike any other 24-pin dot-matrix printer because it uses a vertical, rather than horizontal, arrangement.

Paper enters the machine from the back in the normal way and as it is fed around the platten roller, the printhead prints onto it almost from below. All the mechanics and

DOWN

the electronics are positioned underneath the roller and tractor feed. The fold-down front of the machine reveals the printhead to change the ribbon.

Although this means that the DL-1100 takes up little room from front to back, this saving is only worthwhile with cut sheet paper, without the pile of 'raw' paper.

The DL-1100 is a semi-wide carriage machine. It can print 110 columns across paper about 11in wide – a good compromise. It works like any other printer and can produce four different qualities of print – high speed draft, normal draft, correspondence and NLQ.

The high speed draft is a little faster than the only reasonably fast normal draft print, but even nastier to look at. NLQ print is much better and quite fast, but rather light and feeble. Four character styles are available in NLQ mode, but these are all similar in style. Other fonts are available.

Somewhere between lies the correspondence quality print which is produced at a fast rate and is adequate for legible memos and reports, if not for real correspondence.

The DL-1100 can emulate both Epson LQ and IBM Proprinter and it also uses Fujitsu's own weird control codes. The range of NLQ character styles is only easily selected from the Fujitsu codes.

The machine is set up by way of a complex printed menu system which leaves two groups of selections which are chosen from the front panel.

The DL-1100 is a commendable attempt to break away from traditional printer design in a budget machine. However, most of the changes appear more change for its own sake than any real progress.



FUJITSU DL1100 – A BREAKAWAY FROM TRADITIONAL DESIGN

BROTHER M-1824L

The £684 M-1824L is a large printer for its 80-column width. It has a solid metal chassis inside and presents a rugged exterior.

The print from this machine is good if not exceptional. In draft mode it is clearly dot-ridden, but in NLQ mode the characters are particularly crisp with only a hint of a jagged edge.

The M-1824L is no slowcoach either. In both draft and NLQ modes it fares well against the competition.

Both cut sheet and fanfold paper can be used with ease and the push-feed tractor unit is hidden away at the rear of the machine. Cut sheets are fed in using the same paper guide raised into an upright position and switching between paper types is simply a matter of automatically 'parking' the fanfold paper and moving a single lever to the cut sheet position. Paper is fed into the machine automatically and efficiently every time.

The M-1824L can emulate not only the 'standard' Epson LQ and IBM Proprinter codes but Diablo daisywheel codes too – not used much these days, but it may come in useful.

Which emulation is in operation, like almost every other aspect of this printer, can be controlled from the front panel as well as with codes from your Beeb or Arc.

The front panel includes a two-line, 16-character alphanumeric display which constantly indicates how the printer is set up and allows you to change settings with an efficient and simple menu system printed on the display and selected with the front panel buttons.

This really does make using the printer, beyond the control of the software used on the computer, a simple task. This is a strong machine which performs quite adequately for most needs.

SEIKOSHA SL-230AI

The £804 SL-230AI is unlike most other machines. This model is of rugged construction, being built around a strong metal chassis. The only fragile part is the acrylic plastic cover on the top.

The SL-230AI is a wide carriage machine, but it takes up little more room than a 'conventional' 80-column machine. Both tractor feed and friction feed are built-in and the latter is a push-feed unit which, although flexible, usually proves troublesome

LQ-40C
NLQ RC
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EPSON LQ-400

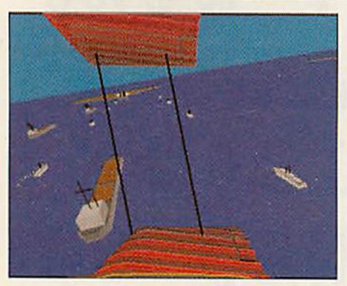
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CITIZEN 124D

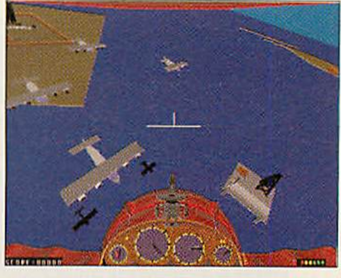
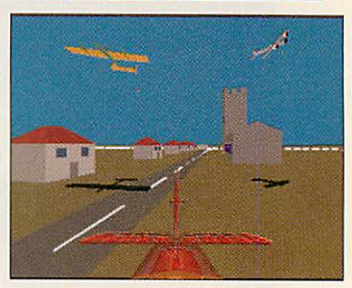
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BROTHER M-1824L

BBC A3000 / ARCHIMEDES / BBC A3000 / ARCHIMEDES / BBC A3000 / ARCHIMEDES

Chocks Away Extra Missions

CHOCKS AWAY

This new updated Mark II Chocks Away with supersmooth animation really is flight simulation the way you've always wanted it. It has everything for the beginner and the expert:

- Beautiful 256 colour graphics and 'nerve shattering' digitised sound effects
- Easy to fly, yet highly manoeuvrable bi-plane - ideal for all ages/skill levels
- **Revolutionary 2 Player Option** using split screen display. This allows 2 players to each fly their own planes simultaneously in practice, dogfights, or missions
- Full joystick, dual joysticks, mouse and keyboard control options
- **Amazing "Black Box Flight Recorder"** included so that you can record your own flights and then save & replay them. 90 minutes of totally absorbing pre-recorded training flights are included with the game
- Internal/External views of your plane can be selected from front/rear/left/right
- Powerful 30mm canon capable of very rapid fire and long range destruction
- Easy to read instrument panel and simple controls
- 3 very varied immense maps to explore - approximately 18000km^2 in total
- 20 fascinating and varied missions of increasing complexity are included with a promotion system from Cadet right through to Marshal of the RAF
- Superb range of targets/enemies including bombers, triplanes, fighters, tanks, control towers, anti-aircraft guns, head quarters and patrol boats

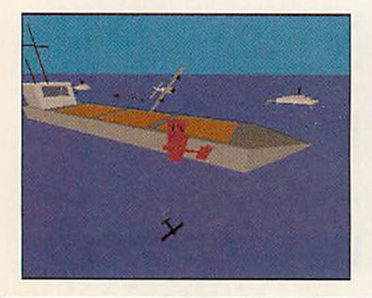
<u>Chocks Away Mark I Version</u> was awarded <u>GAME OF THE YEAR 1990</u> by **Acorn User, A&B Computing (now Archimedes World), RISC User & Micronet**
"Graphics in the game are superb, smooth and with plenty of ground detail... this is a really enthralling flight simulator with plenty of variation and features to ensure longevity." **RISC User, Dec '90**
"Chocks Away is a delightful game." **Archive, Jan '91**
"Chocks Away is a brilliant game." **BBC Acorn User Dec '90**
"... It's a really great game, Playability 10. Value 10." **The Micro User, Jan '91**
"(<u>Chocks Away Mark II Version</u>)... The increased speed obviously makes the game more responsive and fun to play, well and truly overtaking Interdicter II as the best Archimedes plane game." **New Computer Express, Feb '91**

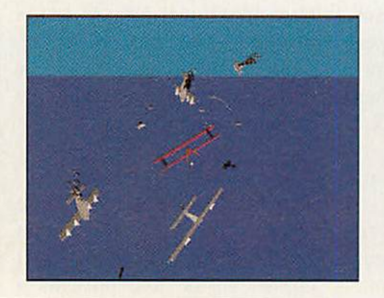
CHOCKS AWAY EXTRA MISSIONS

This consists of a new manual and a disc containing an additional 26 missions (6 of which are reconnaissance missions). It is loosely based on the original Chocks Away and features an extensive range of extra features and improvements. To run it, you will require the MkII version of the original Chocks Away. Extra features include:

- 16 new & detailed maps based over land and sea.
- 20 enemy planes and 20 enemy targets are included in each mission. Over 1000 extra targets and planes have been carefully defined.
- Considerably improved action on all missions with plenty of targets to shoot at and plenty shooting at you.
- You can view the action from any of the enemy planes or targets and your own control tower at any time even while still controlling your own plane or watching a saved flight. There is a selection of tracking cameras (with adjustable zoom lenses!) around the playing arena. In addition a phantom plane can also be selected to follow the action on any or your black box flight recordings.
- Improved enemy pilots capable of performing loops, rolls, stall turns etc. All enemy planes are carefully modelled using the same equations controlling your own plane. This ensures both an accurate and fair simulation.
- More enemy planes and targets to shoot including: Three Engine Fighters, Enormous Cargo Planes, Airships, Barrage Balloons, Gun Boats, Oil Tankers, Trains etc.
- Six reconnaissance missions where you are required to take photos of various installations with your new on board camera.
- Improved graphics over the 16 maps including Complex Cities, Houses, Railways, Roads, Rivers, Bridges, Lampposts, Railway Stations, Oil rigs, Piers, Beaches, etc. to mention but a few. In total over 100 different graphics have been defined.
- Serial Port Link Up option so that you can link up 2 BBC A3000 or Archimedes computers and 2 pilots can fly simultaneously in full screen mode.
- Extensive enemy flak guns and improved enemy plane guns help make the new missions both more interesting and challenging to say the least!
- Improved digitised sound effects plus, of course, all the extensive options which are available with the original Chocks Away.

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CHOCKS AWAY COMPENDIUM (Chocks Away & the Extra Missions)	£39.95
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with thick multi-part forms.

Cut sheet paper loading is automatic, triggered with the bail bar lever and straight every time. For quick change-over between paper types the SL-230AI can temporarily 'park' the fanfold paper out of the way to load a single sheet of, say, headed paper.

The SL-230AI also produces better quality print than most of its Seikosha forerunners. In draft mode, text is dotty and slow but, in NLQ mode, the print is dark and crisp and reasonably fast.

Unusually, extra NLQ character styles cannot be added to the SL-230AI with plug-in cards or cartridges, but the nine supplied built-in will probably satisfy most needs.

On the front panel are three 'thumbwheel' switches to select print style, size and quality and page size, each with a small window displaying the setting. It is low-tech, but effective.

Instead of the usual fiddly dip switches or complex menu systems, the SL-230AI has a plug-in card which has about 25 functions selected on it with small switches and knobs.

The SL-230AI can be set-up (with the card) to emulate either the Epson LQ or IBM Proprinter, which should satisfy most Beeb or Arc users.

Make & Model	Price (exVAT)	Measured Speed Draft	NLQ	Interfaces Cen.	RS432	Sheet Feeder	Compatibilty Epson	IBM	Other	Built-in Fonts	Plug-in Fonts
Brother M-1224L	£330	80	32	Yes	No	£99	LQ	No	No	1	No
Brother M-1824L	£595	125	55	Yes	Yes	£169	LQ	Pro	Diablo	5	£89
Citizen 124D	£279	82	32	Yes	£30	£84	LQ	Pro	NEC	4	£35
Epson LQ-400	£255	88	39	Yes	£36	£79	LQ	No	No	2	£35
Fujitsu DL-1100	£375	93	39	Yes	£55	£120	LQ	Pro	Fuj	4	£54
Seikosha SL-230AI	£699	109	49	Yes	Yes	£120	LQ	Pro	No	9	No
Tandy DMP302	£399	141	65	Yes	£37	£87	LQ	Pro Graph	No	6	No

BROTHER M-1224L

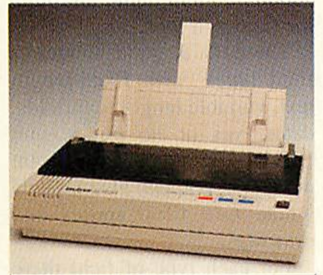
At £380, this is the cheapest in Brother's 24-pin range, but it is a bit of a disappointment. The M-1224L is exceptionally small and seems to be made almost entirely of plastic. The only reason it is not easily damaged is that it is flexible and shock resistant.

The tractor feed cannot be crammed into the tiny case, so this is a clip-on extra item, included in the price. For cut sheet paper the tractor unit must be removed and stowed away. No paper 'parking' here. The tractor's clip-on nature also means it's a pull feed unit, pulling the paper through the printer after it has been printed, rather than pushing it.

The bulk of the ribbon is in an easily-fitted cartridge, but a length must be messily pulled out and clipped on one side of the machine.

The M-1224L is neither very fast nor capable of particularly good print. The draft print is readable and the NLQ print (there's only one NLQ font provided) is of a reasonable density and nicely formed, but the M-1224L has trouble producing even print.

Only Epson LQ compatibility is provided and the front panel controls are also minimal. Print quality and character pitch can be selected, but


BROTHER M-1224L LACKING

all else must be achieved with software commands alone.

The M-1224L neither performs well, nor does it inspire confidence or even a confirmation of money well spent.

TANDY DMP302

Costing £459, the Tandy DMP302 is, above all else, tremendously fast. It beats most printers in this price range by a margin of about 50 percent. It can complete a page of text in NLQ print in under 45 seconds.

The DMP302 is an 80-column printer (a 136-column wide carriage version, the DMP2103 is also available) with a substantial feel about it. The flip-up paper guide serves both fanfold and cut sheet paper. The tractor unit for fanfold paper is a push-feed type and sits at the back of the machine concealed by a cover. With the press of a button, fanfold paper can be 'parked' for a quick changeover.

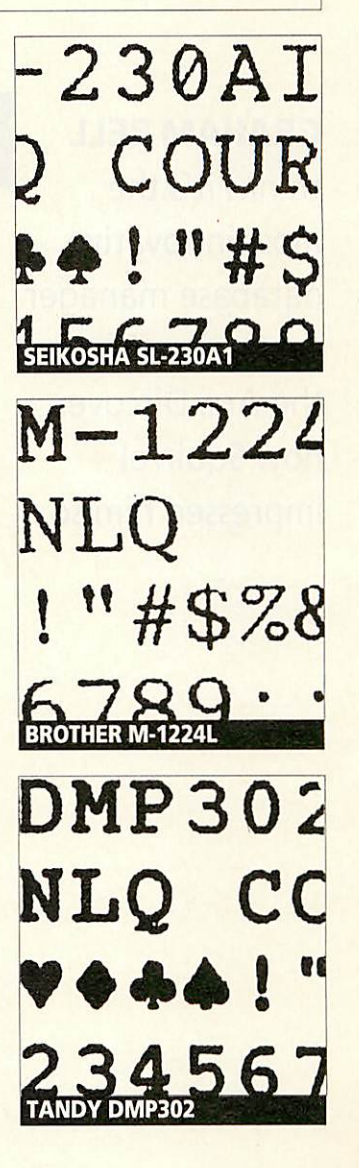
Cut sheet paper is loaded automatically and efficiently, but the printer seems to get 'confused' as to whether paper is in the printer or not and frequently refuses to print on loaded paper until it is switched off and on again.

The draft print is unusually clear to read and in NLQ mode, although the dots are not as fine as some more expensive machines, the print is sufficiently good.

NLQ characters are available in six different styles, but a range of plug-in typestyle cartridges would help.

Only the print quality and the pitch can be selected from the front panel. The font and most other features are altered with a printed menu system. The DMP302 must be turned off and on again to initiate this, which prohibits manual changes of typestyle in the middle of a document, and it insists on printing out the whole set of parameter settings each time.

The DMP302 has emulations for Epson LQ printers and both IBM Proprinter and Graphics printers. The DMP302 is an eye-opener for any pre-conceptions of how a £450 printer can perform.



SEIKOSHA SL-230A1

BROTHER M-1224L

TANDY DMP302

TOP OF THE TREE

GRAHAM BELL thinks it's the most innovative database manager yet released for the Arc. Discover how Squirrel impressed him so

Not everyone is an Archimedes 'guru'. So the ease with which a new database can be set up is critical, in schools, offices, and other applications.

On that basis, *Squirrel* could be very successful. Tutorials provided in Archimedes software manuals are usually worth the effort in the early stages, but with *Squirrel* it proved unnecessary.

Installing the pre-release (though largely bug-free) version of *Squirrel* proved painless: it runs on any Archimedes. As soon as you catalogue the disc, you are required to make a backup, and register by telephone with Digital Services to obtain a 'key number' unique to your copy. This key serves only to identify copies – it doesn't prevent you from making backups, or installing *Squirrel* on your hard disc.

You don't need to type in the key number every time you fire it up, nor do you ever need to insert the master disc. Once installed, a simple double-click sets a cute little squirrel on the icon bar. There is a short icon bar menu that allows you to set up new databases – or 'tables' in *Squirrel*'s terminology – or create a 'view', which is a different way of looking at an existing table.

Choosing Create Table opens a blank window with a toolbox of coloured icons attached *Draw*-style. These are used to delineate the fields of the database – you choose a tool from the toolbox and draw the new field in the window. As each field is drawn in, a dialogue box pops up to allow you to specify further details about the field name and how the field will look.

There is a good range of field types, with fixed-length text, variable length text fields, dates, yes or no boxes, and both fixed and floating point numbers. You can also include whole *Edit* files, sprites and drawings.

For each type of field there are a few details you have to add to the dialogue box – the length of your fixed-length text for example, or the number of decimal places in fixed-point numbers. For most data, you can also choose a particular anti-aliased typeface, colour, background and size.

The whole system is extremely flexible and can be used to make a table of data look very attractive and easy to use. The Date format is particularly good – you can choose to show the date, month and year in full or abbreviated form, and it will add the actual day of the week if you want.

You can limit number and dates to particular ranges and provide lists of valid words for text fields to ensure any data entered is correct.

Any of the 16 Wimp colours can be used to make the on-screen presentation more attractive and bigger, bolder text can be used to emphasise more important fields. You can put a grid onto your table design to help keep the fields neatly aligned, and you can drag the fields about and extend them to any size. When you've finished, you can save the table design to disc.

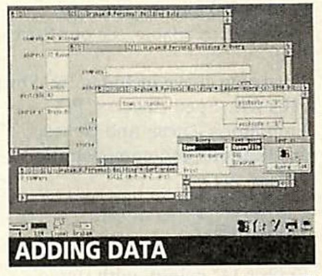
Adding data to your new table is really easy: if you've set up the table well, it's like filling in a form.

In the finished version, Digital Services will include 'default contents' for fields that can be set up in the table design. This way, you won't have to enter everything for every record by hand.

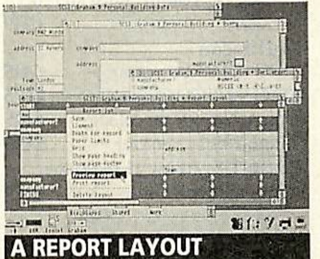
Alternatively, you can import data from an existing database. With *Squirrel*, this is quite limited but simple. There is no special treatment for the most likely candidates, *Viewstore*, *Masterfile* and *Interbase*, but if you're familiar with any of these, then there is no real problem.

You can control the order in which the records are imported and you can skip unwanted fields in the original too. However, you can't import data into a Boolean (yes/no) field from a *Viewstore* field

SETTING UP A NEW TABLE


ADDING DATA

A QUERY FLOWCHART


A REPORT LAYOUT

containing Y or N, which ought to be possible.

The established database can be browsed easily, with the PAGE UP and PAGE DOWN keys going to the next or previous records. This applies to any field – it goes by the alphabetical order of the field the caret is in, or the field the mouse was over if you use the menu to do the same thing. The menu also offers a GOTO facility to find any particular record instantly.

Data can be dragged from a field directly into *Edit* or another application, or copied from one record to another by dragging – you open two or more views onto the same database and copy fields between them. A single record can also be printed easily, using Print Record, but as this uses whatever anti-aliased fonts, colours and backgrounds you've chosen, it can take an age if you don't have a Post-script or direct drive laser printer.

But it's the ease with which existing records can be searched for and displayed that is impressive: all you have to do to find all the records which have addresses in London is to select Define Query from the menu, fill 'London' in the blank Query form (it matches the main record layout, so you can search on any field), and choose Execute Query. Up pops the first record which matches your query. You can't alter the data while in Query mode at present, though the full version of *Squirrel* will allow this, and also allow making the set of Query matches into a separate database.

An innovative feature of *Squirrel* is the graphical view of queries like this. It can turn your query into a 'flow chart' with filters showing which records are chosen and which are filtered out by the query. Using the flow chart, you can set up more complex queries using wildcards, AND and OR, and see the logic of the query with clarity. Something like 'all the building suppliers or manufacturers who do brass or porcelain door handles who are based in London but have a postcode not starting with S or E' is confusing, but with the flow chart display, you can see immediately whether you're going to get what you expect. And if it isn't, you can edit the query by dragging fields and links on the flow chart too! Very impressive!

For frequently executed queries, you can save all the details in a query file that can be executed by double-clicking, saving all that bother.

Queries allow you to look at particular facets of your data on screen, or perhaps drag data out of a few fields. But for getting more data out, the reporting facility is used.

This takes the subset of records picked out by a query, and prepares a printed summary of them.

How you define what should appear on such summaries is always the most complex part of a database manager.

Squirrel valiantly tries to make things easy by dividing the report into 'layers': the header at the top of each page of the report, then a series of layers known as sort groups, then the main layer defining what should be printed for every record in the query sub-set, then the footer at the bottom of every page of the report.

The manual needed three reads while I was setting up my first report. However, once you grasp the main idea, it is clear how it works.

The actual layout of the report is created entirely with the mouse, dragging fields from the 'form' window in which the Query was defined onto the report and dropping them on whatever layer you want the data to appear at. The rest of the layers shuffle themselves about automatically to accommodate the new field, or you can create extra space by hand by increasing the depth of any of the layers. You can also drag in sprites or drawings and put them anywhere on the layers – the most obvious use is to put a logo or something on the header or footer layer.

The printout of the report can be previewed on screen in a window or printed using any of the Risc OS printer drivers using the fonts, colours and so on set up in the table design, or the plain text of the report can be saved to a file. The file is plain text, so can be loaded into *Edit* or a DTP package for further processing.

A couple of things missing from the pre-release *Squirrel* at present are important – the ability to calculate values in reports for example, to allow you to produce totals and sub-totals. And sorting is far from perfect as yet; it is in Ascii order, not true dictionary order. But both are due for inclusion in the full release later this month.

Aside from this, *Squirrel* is astounding. It is the most innovative database manager on the Archimedes and I would compare its ease of use only with *Filemaker* on the Macintosh. Most things can be done by dragging fields about in the windows. It doesn't have some of the 'bells and whistles' of Minerva's *Flexifile* but it impressed me in a way *Flexifile* just didn't.

Squirrel lacks the relational capabilities of *Multistore*, which remains by far the most capable of the Arc database managers because of this. But setting up a new *Multistore* database is a task suitable for only the more technical users.

The price of £170 (inclusive) appears expensive when compared to applications like *Flexifile*, but *Squirrrel* is so easy to use it's worth it.

Digital Services has plans for more fully relational versions in the future, and a £600 Econet version should accompany the normal release version in April.

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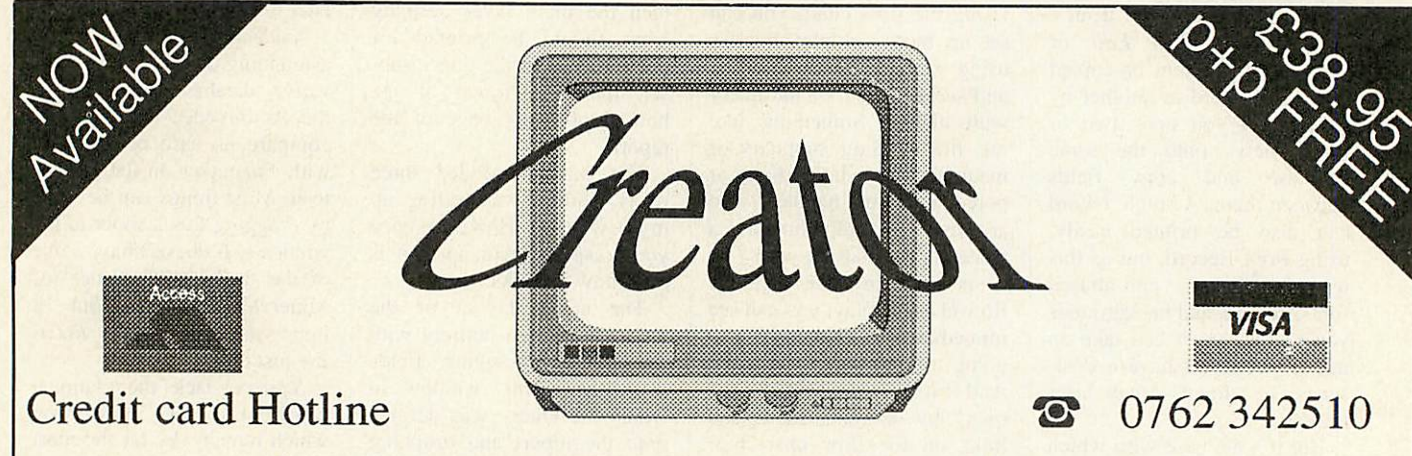
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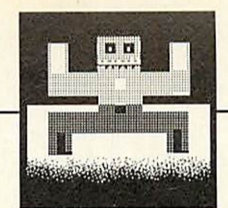
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GAME SHOW

As usual, there is not a vast amount of new entertainment software visible at this time of year, however, many games are in the pipeline ready for the summer.

Shaun Hollingworth, the man responsible for some of the Arc's best games, such as *Pacmania*, *Terramex*, *Manchester United FC* and *Mad Professor Moriarti*, will soon be working on a conversion of the next game to be released by Krisalis, called *Hill Street Blues*.

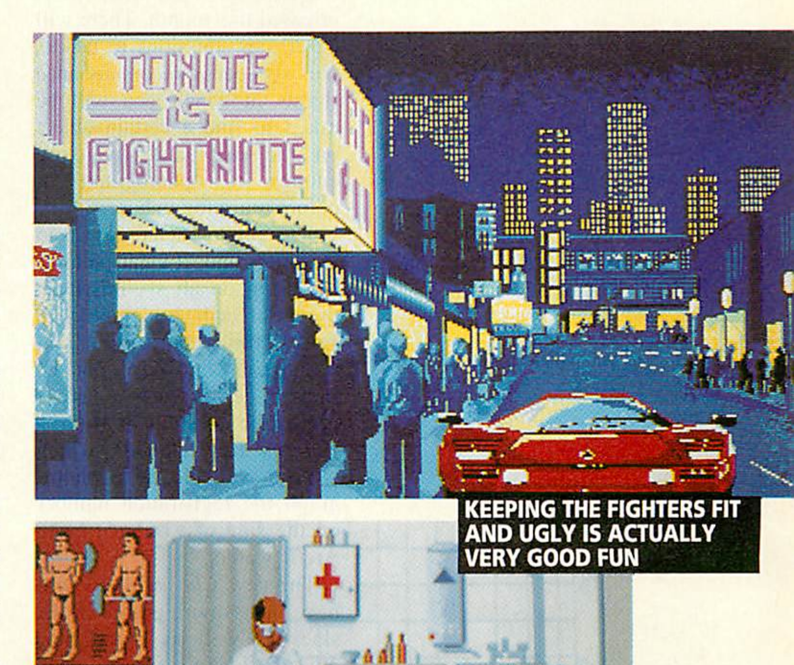
The conversion won't take long once it has been finally decided to go ahead with an Archimedes version – after all, it took Shaun only four days to convert *Mad Professor*.

In *Hill Street Blues*, you play one of several policemen assigned the great honour of reducing crime statistics in the vicinity of the Hill Street police station.

When a crime is reported, its location is highlighted on a big map of the city, displayed on the screen. Into the blue and white car you hop, siren wailing, twirly lights blazing, your PD badge glinting in the afternoon sun, and off you go – to serve and protect, or deal with naughty people causing any disturbance.

Hill Street Blues is described as an arcade game with strategic affections. It will be the first of many Krisalis titles to appear on the Archimedes this year.

Sam Greenhill



KEEPING THE FIGHTERS FIT AND UGLY IS ACTUALLY VERY GOOD FUN

WORLD BOXING

Krisalis Software. Tel: (0709) 372290. Archimedes £24.99

I must admit that the prospect of becoming a boxing manager did not greatly excite me to begin with. After all, is there any fun in watching some hunk of muscle having his nose turned inside out so that he cannot smell his food?

Well, I was wrong. *Boxing Manager* is actually very good fun. You have four or five boxers under your wing and they must be kept fit and ugly for forthcoming fights, which you arrange.

Situated on your large wooden desk is a telephone, which occasionally rings, but otherwise lifting the receiver enables you to call other managers, using a very sleazy English dialect to set-up various boxing bouts.

Once a fight has been arranged you must inform one of the two boxing boards of control, who take a day or two to consider the proposal. With any luck your secretary will place a letter in the in-tray with news that they've managed to fit your lad into their schedule. The next stage is to call one of your scouts and send him along to spy on the opponent training – that way you know how best to train your boy.

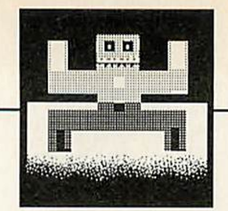
A man called Jim runs the keep fit room and main man Phil checks on health in the Physio, both accessed from the main corridor. But down the stairs and in the alley awaits your gleaming red sports car, the run-about which transports you to the boxing hall. At the fights you don't actually see any action, but a pair of right old Bill and Bens keep you informed with commentary.

Boxing Manager is much more fun to play than any arcade style boxing game because there is the feeling that you've worked at what you've achieved, rather than just hammering buttons. It doesn't matter that you don't see the action because that's not the point.

Sometimes the game gets a bit slow and frustrating and it would be nice to print out a boxer's details, but those are my only real quibbles. I like it and the graphics are nice too.



ALTHOUGH YOU DON'T ACTUALLY SEE THE ACTION, YOU'RE KEPT INFORMED



CHOCK CONTEST

The Fourth Dimension is planning to run a competition with its new missions disc for *Chocks Away* when it is released this month. There will be 20 new missions to tackle, plus six special reconnaissance flights in which you will be asked to find a certain object on the map and fly close enough to 'photograph' it before returning to base.

The 'photographs' are saved as sprites and, if clear pictures are taken on all six missions, the pilot will be eligible to enter the competition. It sounds fun, but 4D is not the first to design such a task – one of the missions in *MiG-29 Fulcrum* from Domark, which is now available, is to photograph the registration number on the side of a submarine in Arctic waters.

The new *Chocks Away* will have many more planes in the skies as well as brand new objects floating around, such as airships and massive oil tankers which can be blown up! The extra missions disc will only be available to existing owners of *Chocks Away*, although 4D is planning a compendium based on the original and extra missions. Should be a snip at £39.95.

There will also be another *Chocks Away* game available soon which allows computers to be linked together to play the same game. This version will enable two computers to be linked via the serial port, or four computers to fly full-screen over an Econet network, or again four players over a small MIDI network.

The MIDI option will be a lot cheaper if you don't have an Econet set-up, and special MIDI interface expansion cards ought to be available for about £35 each. The serial port method will be by far the cheapest but there can only be two players.

The company also has a few other games in the pipeline. Actually, that's an understatement, because the company's Steve Botterill is predicting a further 20 titles will be out by the end of the year.

The sequel to *The Wimp Game*, called *Gum Shoes*, will be more comprehensive than the former. We shall also be seeing a humorous arcade style game called *Boogi Buggy*, the buggy being a 'personified dodgem car' designed to conquer evil and save the world. My imagination says this buggy will look the cartoon car in *Who Framed Roger Rabbit?*

According to 4D, the buggy boogies around a surreal landscape picking up objects, and 'eye-views' capture the best angle at which to control it.

A software speech synthesiser is also planned for the Archimedes. This will work in the desktop environment and employ a 'gender bender' facility, ie, a user-selectable male or female voice. Called *Articulate*, the application will also display a male or female head on the screen with the mouth movements corresponding to the phonemes being produced. Watch out for this.

Hopefully sooner than that will be a host of 'cheats' for many new games on the Archimedes. A new version of *Cheat It Again Archie* will boast cheats for around 36 recent titles.



MAHJONG PATIENCE HAS THAT 'ONE MORE GO' ADDICTION FACTOR

PATIENCE

Cambridge International Software. Tel: 071-833 4023. Archimedes £19.95.

Over the last few months I have seen a number of new Archimedes games and most of them have been good. However, most have not lasted more than a day or so before being filed deep in the depths of my disc box. One exception is CIS's *Mahjong Patience*.

It's called 'patience' because it's a game for one, and 'mahjong' because it's played with mahjong tiles instead of cards. The game installs itself on the icon bar and is played in a window on the desktop in much the same fashion as Acorn's *Patience* on the Welcome disc. All the tiles are visible and are stacked up in a vague pyramoidal shape.

You play in a similar way to Pelmanism, but you can only match 'exposed' tiles, ie, ones at the edges of the pyramid. There are four 'instances' of most of the tiles, so you have to think carefully about which ones to remove first. You win by clearing the board – a feat I've only managed once!

There are no flashy graphics or cute animations, but the tiles are very nicely drawn and the game has been 'finished' well. There are a handful of sampled sounds like 'No more moves', but these seem rather unneccesary and were probably just added for padding. The game doesn't need any padding – I altered the program to remove the tacky bamboo backdrop, since it made the display rather cluttered and was very distracting.

To sum up, *Mahjong Patience* has definitely got the 'just one more go' quality to it. It's just a very fun and enjoyable game. Come on, admit it, you played *Patience* more than *Lander* didn't you?

BEAR ESSENTIALS

Gamesters experiencing difficulty with *Blowpipe* from Eclipse, don't tear out your hair – Ganesh 'The Bear' Yoganathan from St Albans has sent in five pages of hints, tips and colour maps explaining the best strategy for surviving five levels of *R-Type* style horizontal shoot-it-if-it-moves, bomb-it-if-it-doesn't gung-ho mania! Unfortunately, the maps would take up rather more space than we are graced with, so all I can say is thanks very much Mr Bear, they look great on my wall. However, here are some of his useful tips on game play.

Start a new game, move around a bit and then go and socialise with a bullet or two. Having lost all your lives, redefine the keys to whatever you like and then start the game again. Notice the zero in the lives box, indicating a healthy mission ahead.

Ganesh The Bear also professes great faith in the extra fireball weapon which can be purchased for a mere 10,000 credits. He suggests the best way to obtain enough credits for this handy device is to play the first level collecting the blue credit bubbles, but to commit suicide before reaching the end. Repeating this process a number of times (with infinite lives) ought to reward you with enough capital to finish off the bad guys once and for all..



BEARING GOOD NEWS FOR BLOWPIPE FANS – YOU MIGHT GET RID OF THE BAD GUYS YET

DESKTOP DUCK

For some months now there has been an on-running debate in this column regarding the bad behaviour of Archimedes games which do not return to the desktop after play.

The controversy was explained in the February 1991 issue but, to recap, in an ideal world people wish all modern games could be started from and run on the desktop, and the user could then return (using a simple CTRL-ESCAPE) to find all spreadsheets, datafiles and letters intact and running smoothly as they were before the game was loaded.

At present many games can only be exited via a CTRL-BREAK. However, some games use 'illegal' programming techniques, such as directly addressing the screen, and you would not want your valuable spreadsheet to remain in memory with funny goings on afoot. Besides, some games need the whole machine to run, so they cannot adhere to the multi-tasking standards of Risc OS. The final argument is that games authors do not want to leave any trace of the software in memory for fear that pirates may copy it.

Two new opinions have surfaced, one from programmer Graham Allan of Fife, Scotland, and the other from the man behind the Archimedes Arm chip design, Acorn's Roger Wilson. Graham says that, although some games do tend to use illegal techniques, there is no reason why they should not be able to tidy up after themselves and clear away any dubious code. He cites *Lander* as an example.

He points out that easier methods of pirating a piece of software exist than trying to hack the memory of the machine. Hypothetically, he adds, hacking would be quite difficult given the complexities of the operating system's memory management.

Roger Wilson puts it quite simply: 'No game needs to destroy the machine and no game uses 'illegal calls', save for direct screen access'. And he should know.

He goes on to say: 'Most games need a certain amount of memory to run and they should ensure that this is available by humane methods, such as quitting other applications before running rather than simply taking instant control of the machine.

'With a gradual increase in the number of 2Mb machines this will not even be a problem in the long run. But returning to desktop, even if this is a clean desktop with no applications running, must be better than going through CTRL-BREAK (or CTRL-RESET) for the games that don't even submit to that. All Mac games can manage this!'

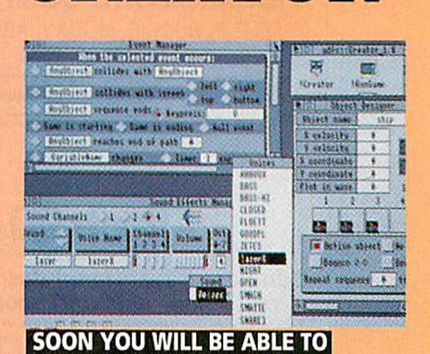
Unless anyone feels they want to take Roger on, I think that just about settles the matter. *All* games should be able to return to desktop. The case is now closed.

ARCADE CREATOR

Alpine Software has released a companion for the *ALPS Adventure Creator*, called the *ALPS Arcade Creator*! If you haven't already guessed, the new software will enable you to create your own arcade games which run from the desktop like any normal game (should!). The *Creator* imports sprites and sounds from applications, such as *Paint*, and manages them with a few rules of plot to produce a game.

You can fiddle with the way sprites (aliens!) move around the screen, the noises they make and the way they behave, as well as many other factors. So far, I've only played two games which have been written using the system – a version of *Breakout* and a sort of *Blowpipe* clone – and they show good potential, although we're talking fairly limited use of the computer's power.

The *Creator* itself is a fully multi-tasking Risc OS application with a very easy-to-use structure, although I think I've seen the 3D button icons somewhere before...



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Next month we will be providing the answer to the one main problem with Krisalis Software's otherwise excellent Man Utd FC – namely, there can only be one player at the keyboard, while the other must find a joystick. Courtesy of Tony Patterson of Cheltenham, I'll show you how to overcome this problem with each player at either end of the keyboard.

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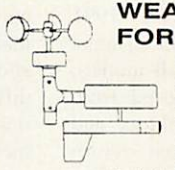
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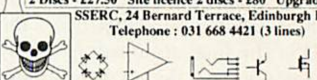
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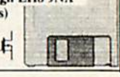
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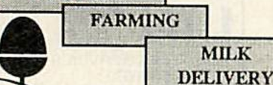
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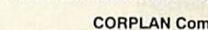
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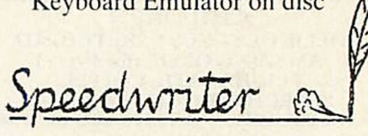
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ACORN USER ADVERTISEMENT PAGES - MAY 1991



GOING BATTY

MAXINE McCOY discovers how the Archimedes can sample and analyse weird and wonderful wildlife noises

Dangling a microphone into a killer whale's pool to record its underwater shrieks may seem rather foolhardy, even to *Wildlife On One* stalwarts.

But John Cunningham's hobby is not as hair-rasing as it seems. After capturing the sounds emitted by creatures as diverse as bats, moths, birds and dolphins, he uses an Archimedes with an Armadillo sampling board to analyse the taped noises.

His research currently encompasses three years of work on 'echolocation'.

Put simply, this term describes the way animals emit acoustic pulses and then analyse the returned echo to target the location of an object, or find a safe route through a particular environment.

While this phenomenon is most commonly associated with bats, John explains that all mammals, including people, will use echolocation to some degree, particularly if visibility is low.

In 1988, John was lucky to receive a one year GEC fellowship to study at Queen Mary and Westfield College with Professor David Pye, who has spent 30 years studying bats. He already owned an Archimedes 310 for personal use, but hit upon the idea of adding a sampler board to analyse the acoustic pulses.

The first challenging phase of the process is to capture the sounds. Taping in the wild used to be a rather haphazard affair, especially underwater. Although a rich variety of sounds could be caught, a lot of background noise would also be included.

Taping in captivity was also problematic, as the animals gave off different sounds compared to those emitted when outside, leading to mistaken conclusions.

Many of the sounds are ultrasonic, so the human ear cannot hear them. John slows them down on playback by a factor of eight, reducing them to sonic frequencies and then digitally filtering the recordings to obtain an improved signal-to-noise ratio, making it clearer for analysis.

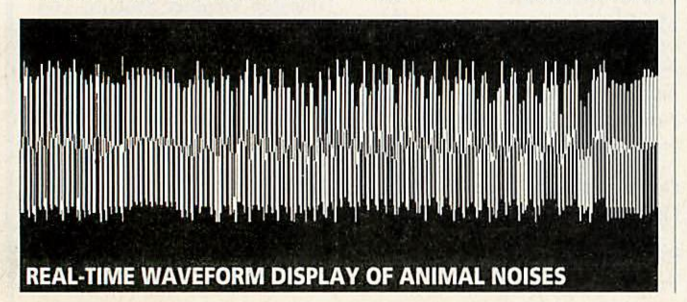
This involves playing a series of pulses through an 16Khz anti-aliasing filter and then digitising them at 41.6Khz using an eight-bit analogue to digital procedure. Individual pulses are extracted and stored in a separate file for further analysis.

'Clicks' and 'sweeps' of varying frequencies are the two sounds most often used in echolocation – most animals use the former, while some bats prefer to use the latter.

Signal processing routines are essential to separate the echolocatory sounds from communication or other noises, and it was at this stage John discovered that the Armadillo analysis programs were not really suitable for his scientific needs. So, as you might expect from an engineer, he wrote his own.

The pulse is measured in time against amplitude, and then a Fast Fourier Transform procedure shows what frequencies are present, plotting the amplitude spectrum on a linear scale. The spectogram depicts the frequency content of the pulse as a function of time, illustrating how the frequency changes. Finally, the phaseogram plots phase over time in a similar way to the spectogram.

The resulting graphs (shown on the left) – a product of John's trusty LC-10 printer – can then be examined and compared for the specific features and patterns of echolocation.


REAL-TIME WAVEFORM DISPLAY OF ANIMAL NOISES

Run on the Archimedes, these routines have proved so successful that Queen Mary College has updated its own system in a similar way.

John is presently upgrading his computer since, as he explained, 'I need the speed and power of the Arm 3 to move into new areas, such as analysing sounds used in communication and for 3D image processing.'

Echolocation is a controversial subject in the scientific world. It is not entirely proven, and theories conflict as to how the animal itself analyses the echoed signals.

Certainly the huge ears and finely developed nasal area of the bat aid the absorption of the vibrations in the echoes, but how the brain deciphers the message is something of a mystery.

Research is rapidly growing and extending as the technology for analysis becomes more sophisticated at all levels. John hopes to record whales off the west coast of Scotland with a hydrophone, so that he can examine their communication sounds. The results should be interesting – apparently, even whales have dialects!

For the less intrepid, the National Sound Library at the British Library will record animal noises onto tape for a small fee, or you could make your own recordings. Then it is an easy task for Archimedes owners, with a sampler such as Armadillo or Armadeus, to carry out their own research.


ALL EARS – THE FENNEC FOX

John assures us that 'even insects emit noises, and sparrows are incredibly interesting. The subject is fascinating.'

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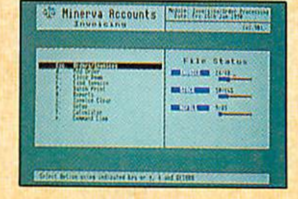
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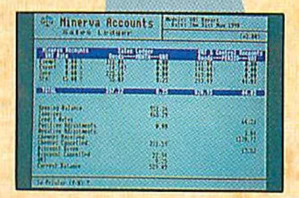
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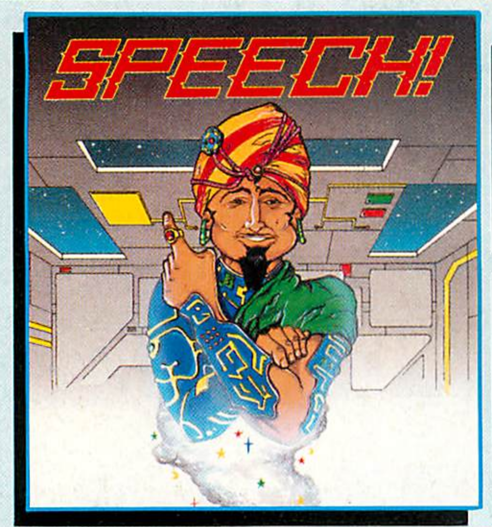
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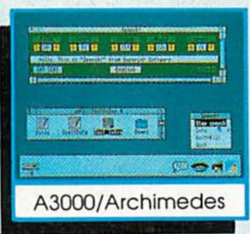


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BBC Micro/Master & A3000/Archimedes

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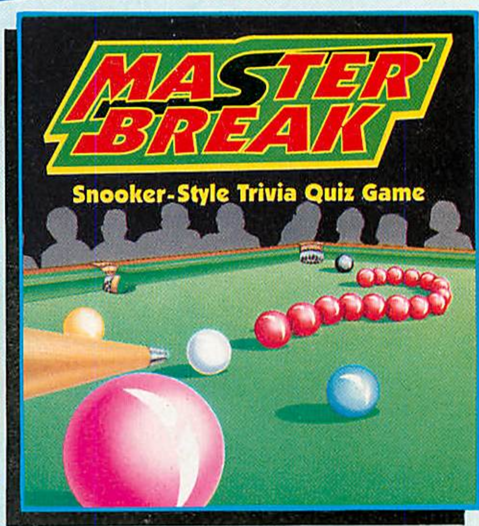
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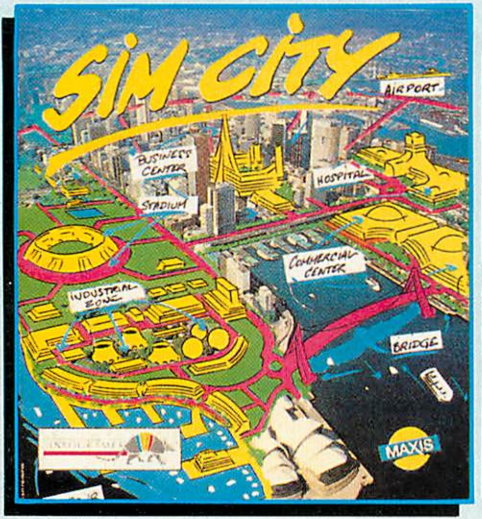
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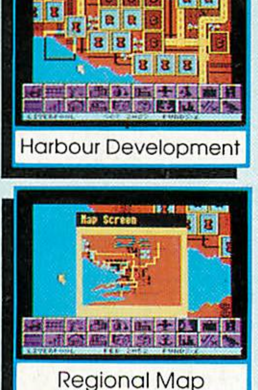



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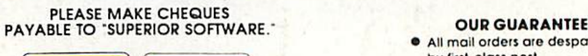




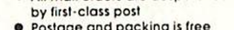
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